AR-V6002FL
User Manual

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Manual's first edition:

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AR-V6002FL System

System Installation Guide

1 Introduction to AR-V6002FL

AR-V6002FL series with Intel Atom D425/D525 processor is a multi-function In-Vehicle computer which is suitable for using in all kind of applications. Besides basic I/O ports like VGA, USB, COM, LAN, and GPIO, AR-V6002FL has complete wireless solutions for selection, embedded CAN BUS function to allow microcontrollers and devices to communicate with each other in vehicle. In addition, AR-V6002FL has intelligent power management function with software utility to monitor power status and control power sequence, and also compliant with most industry standards for in-vehicle usage including CE, FCC, and E-Mark 13.

1.1 Specifications

Features

- Fanless
- Intel Atom D425/D525
- GPS/3.5G/WiFi/Bluetooth module option
- With API to customize power delay timing

Specifications

- CPU: Intel Atom D425
  Intel Atom D525
  Chipset: Intel ICH8M
- Memory: 1 x DDR3 SO-DIMM, Max. 4G, 1G Bytes pre-installed
- Graphic controller: Integrated within Atom D425/D525

External I/O

- 1 x Anti-shock 2.5" HDD
- 1 x GbE RJ45 with LED, Realtek 8111D
- 2 x RS-232, 2 x RS-232/422/485
- 1 x MIC-In (Green), 1 x SPK-Out (Blue)
- 4 x USB
- 8 bits GPIO, 4 in/ 4 out
- 1 x Remote switch
- 1 x SMA for GPS, 1 x SMA for 3.5G, 2 x SMA for WiFi, 1 x SMA for Bluetooth
- 1 x SIM slot
- 1 x CF slot
- CAN BUS Support CAN 2.0A/2.0B protocol (Include API)
- One 12V/24V input connector

Power management

- Comply standard 12V/24V car battery
- Smart ATX power function:
  (1). Power on/off retry
  (2). Adjustable delay time for system OFF by Switch on power module
  (3). System on/off by Vehicle ignition or Remote switch button
  (4). Low Power input monitoring, Auto shutdown
  (5). API for customize delay timing by software

Software

- OS support: Windows XP/XP embedded/Windows 7/ Linux fedora 12

Mechanical

- Dimension: (L) 280 x (W) 181.5 x (H) 76.8 (mm)

Environment Specification

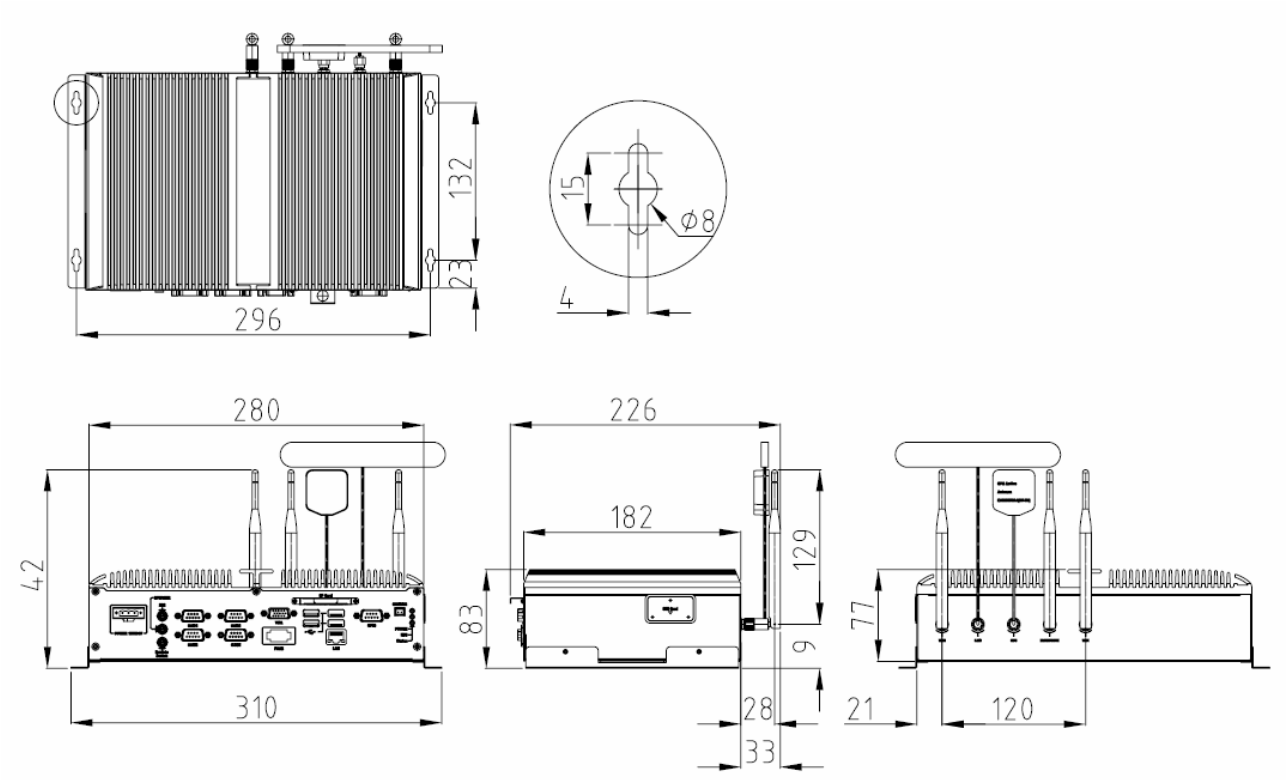
- Vibration: IEC 60068-2-64 5~500Hz, 3GRMS for SSD/CF, 1GRMS for 2.5”HDD.
- Shock: IEC 60068-2-27 50G-500m/s -11ms, operating
- Operating Temp. : -20~50℃ with Industrial Grade CF or SSD
- Storage Temp. : -40~80℃
- Certification : CE/FCC class B/E-Mark 13

1.2 Packing List

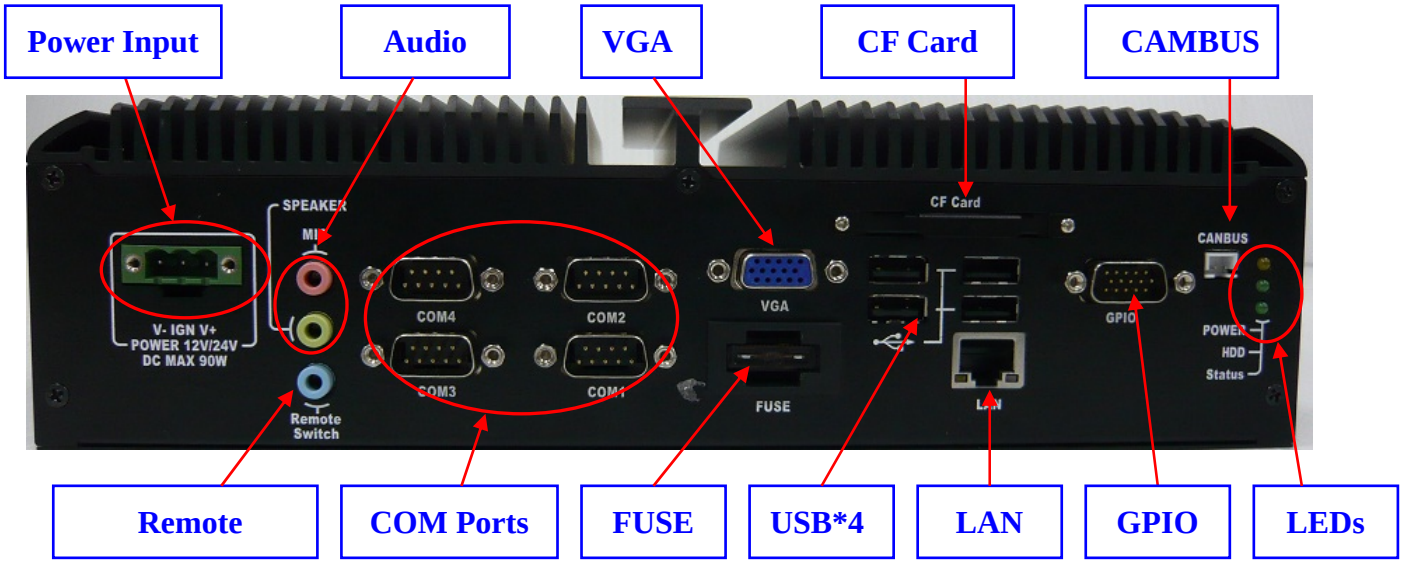
Description	Quantity
AR-V6002FL	1
User Guide CD	1
Wall Mount Bracket	2
Screw pack(2.5”HDD bracket: 4pcs)	1
Terminal block female 3pin	1
Antenna for GPS	1
Antenna for WiFi	2
Antenna for 3.5G	1
Antenna for Bluetooth	1
Remote Switch Cable	1
Fuse 7.5A	1
SATA and SATA power cable	1

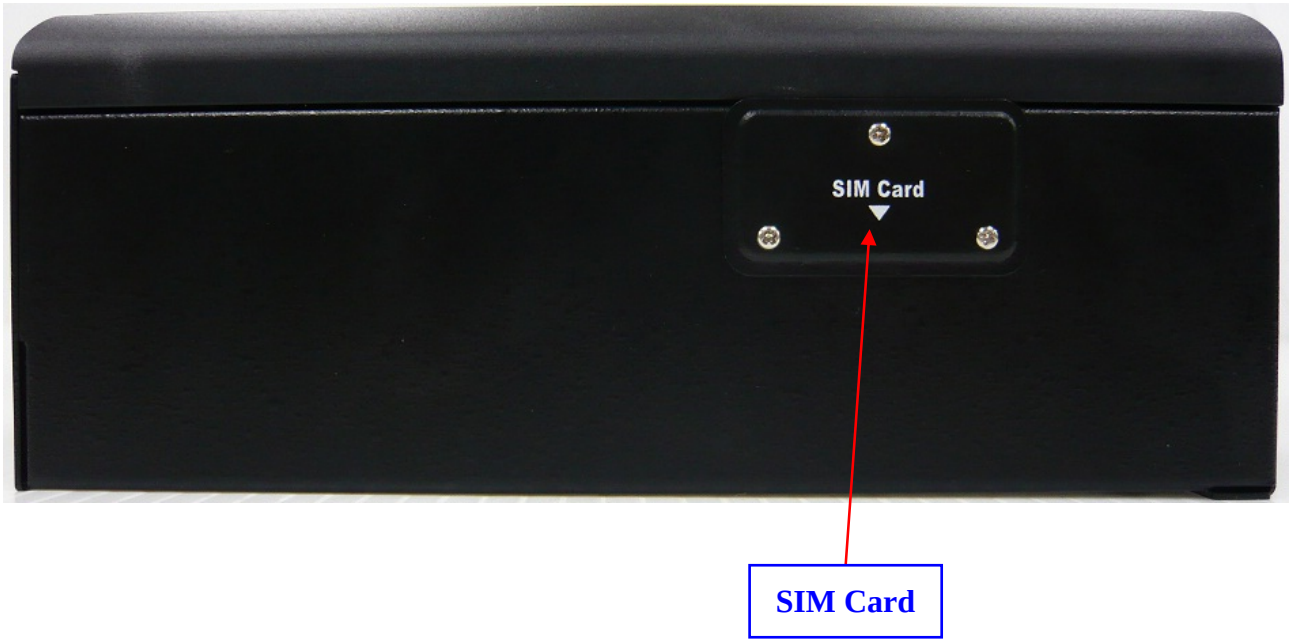
1.3 System Dissection

(1) Dimensions

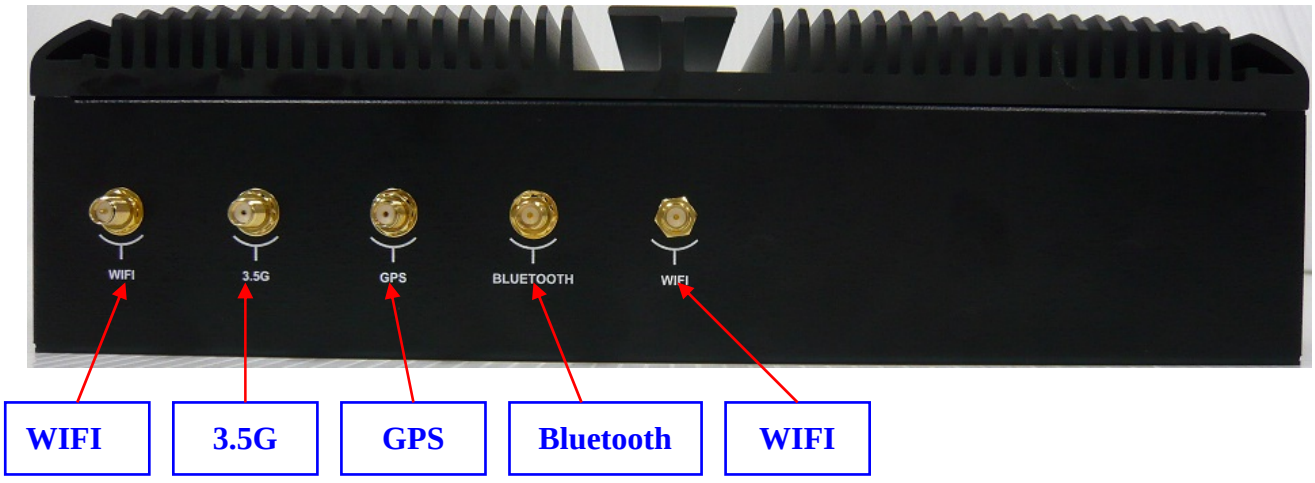


(2) Front Panel

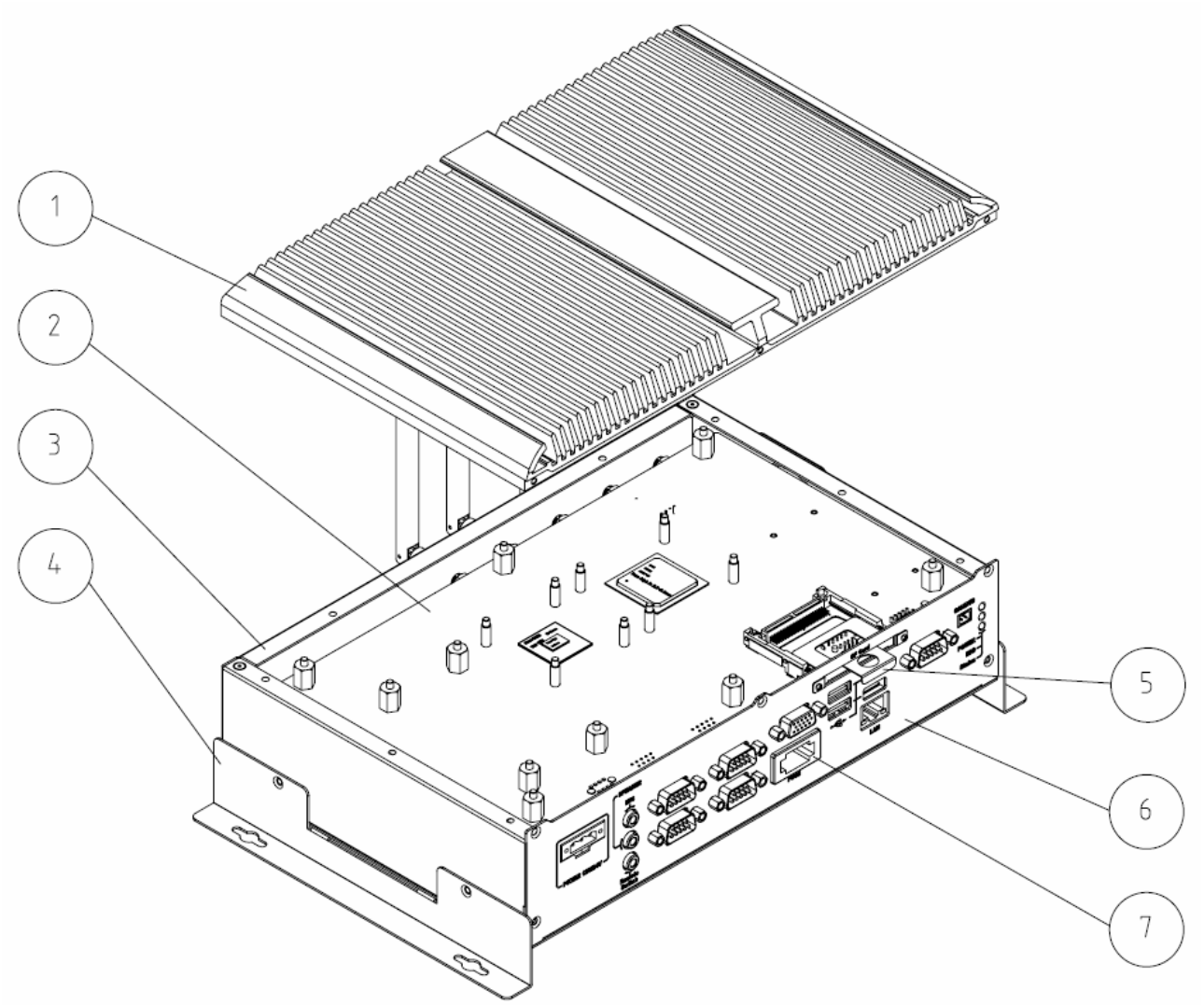


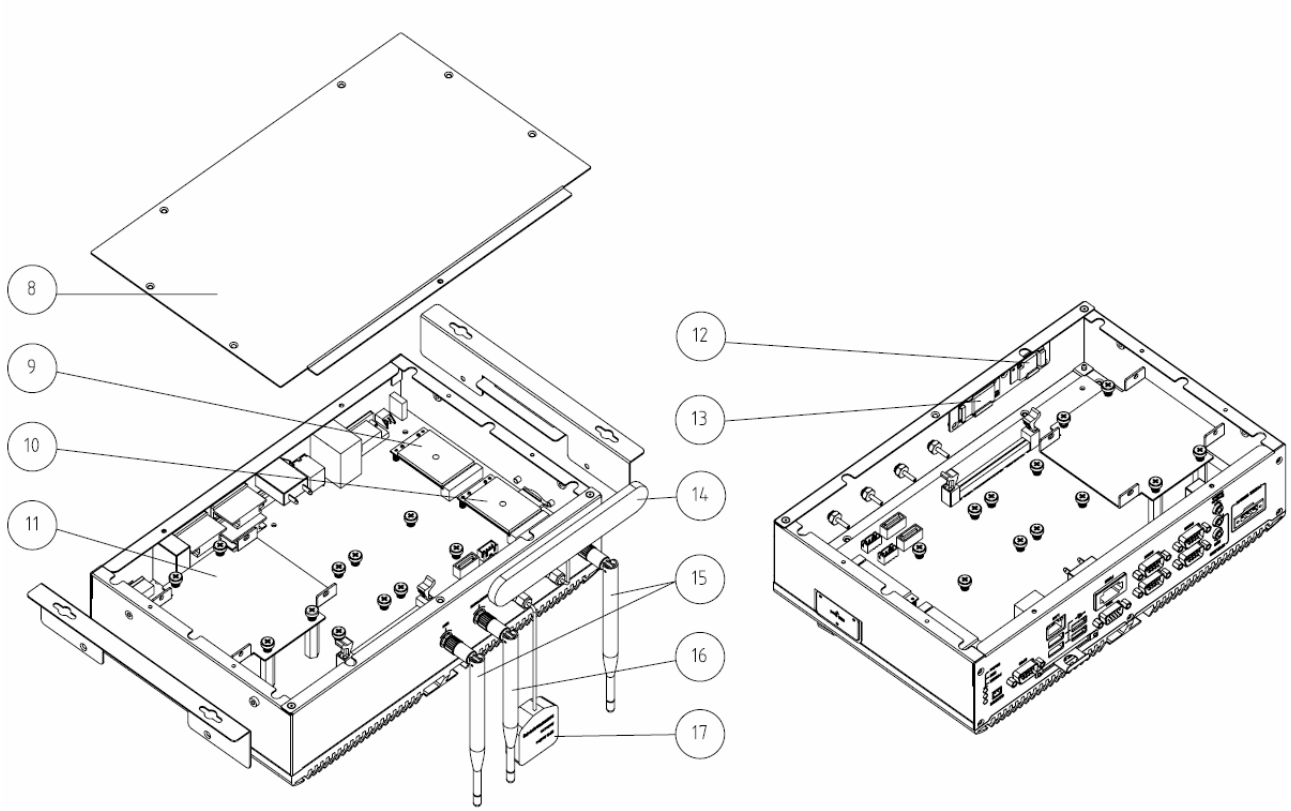

SIM Card
SIM Card

(3) Back Panel


WIFI
3.5G
GPS
BLUETOOTH
WIFI
WIFI
3.5G
GPS
Bluetooth
WIFI

(4) System Configuration




8
9
10
11
12
13
14
15
16
17

Item	Description	Quantity
1	TOP COVER	1
2	B6002	1
3	BOTTOM BASE	1
4	Wall Mount Bracket	2
5	CF BRACKET	1
6	IO PANEL	1
7	FUSE	1
8	BOTTOM COVER	1
9	WIFI MODULE	1
10	3.5G MODULE	1
11	HDD BRACKET	1
12	BLUETOOTH module	1
13	GPS MODULE	1
14	3.5G ANTENNA	1
15	WIFI ANTENNA	2
16	BLUETOOTH Antenna	1
17	GPS ANTENNA	1

2 Procedures of Assembly/Disassembly

2.1 DDR3 Memory Installation

The following instructions will guide you to install DDR3 memory step-by-step.

1. Unfasten seven screws of chassis bottom cover.

2. Install the DDR3 memory module into the DDR3 socket.
   - Align the memory module's cutout with the DDR3 slot notch.

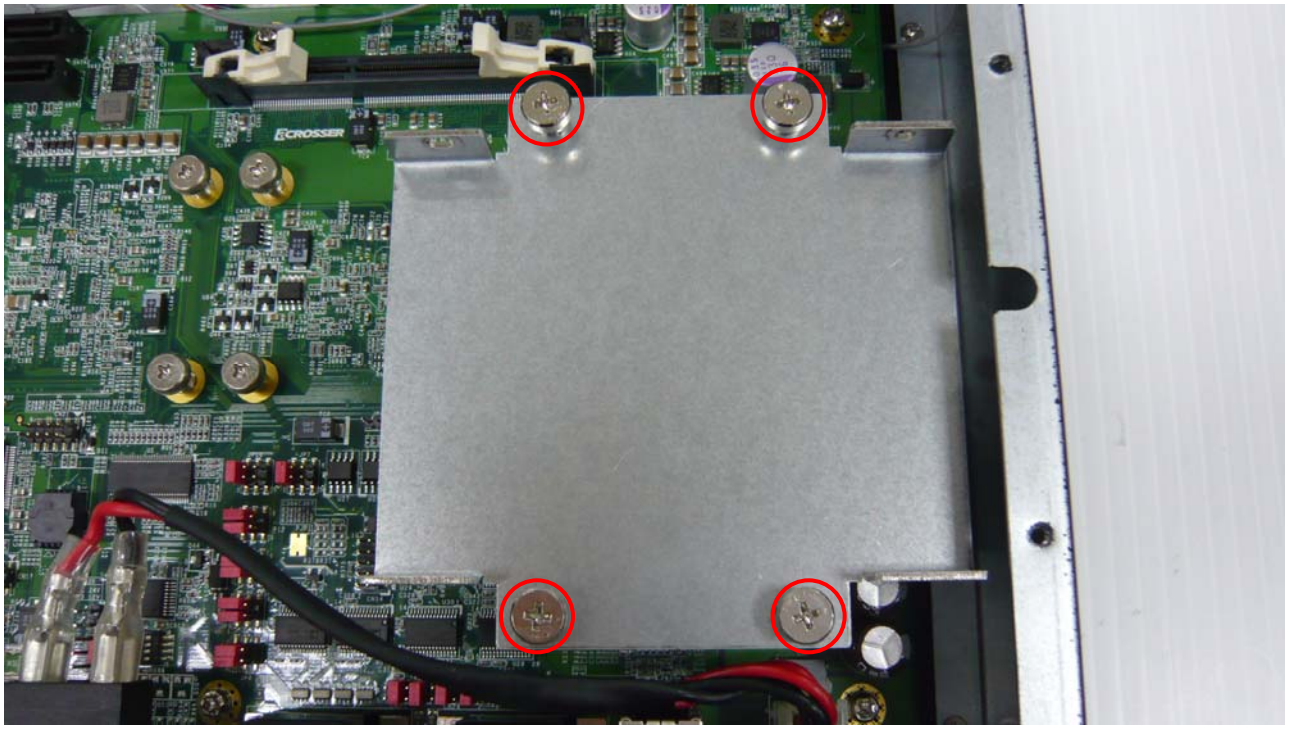
- Slide the memory module into the DDR3 slot.

3. Assemble bottom cover with seven screws.

2.2 HDD Installation

1. Open the bottom cover (the same as above steps).

2. Unfasten 4 screws to release HDD bracket.

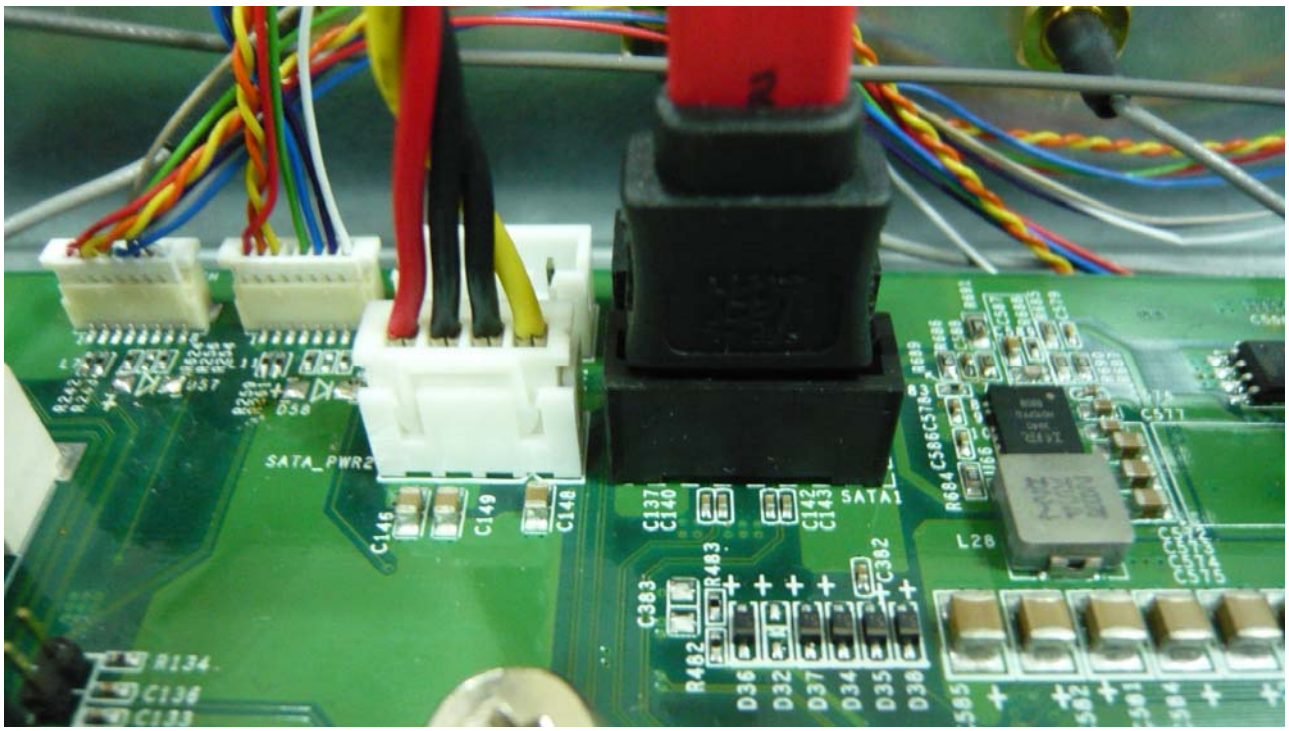


3. Tack out 4 HDD screws from packing bag.

4. Assemble HDD with HDD bracket by 4 HDD screws.

5. Install HDD module back to system by fastening 4 screws.

6. Plug SATA cable and SATA Power cable into Mainboard.



7. Connect SATA cable and SATA Power cable with HDD.

8. Close the bottom cover (the same as above steps).

2.3 SIM Card Installation

1. Unfasten 3 screws to release SIM Card bracket.

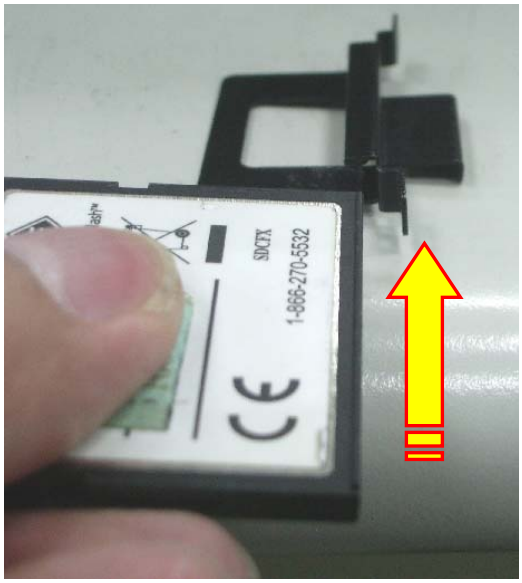
2. Push SIM Card into SIM card slot.

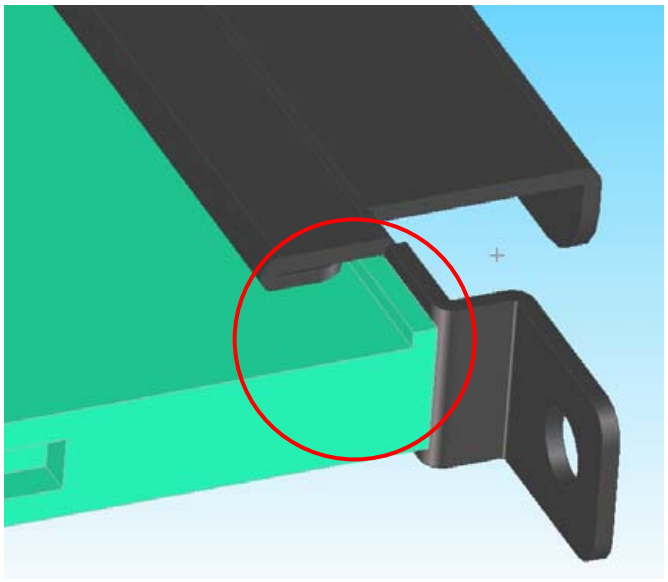
3. Fixed SIM Card bracket by 3 screws.

2.4 CF Card Installation

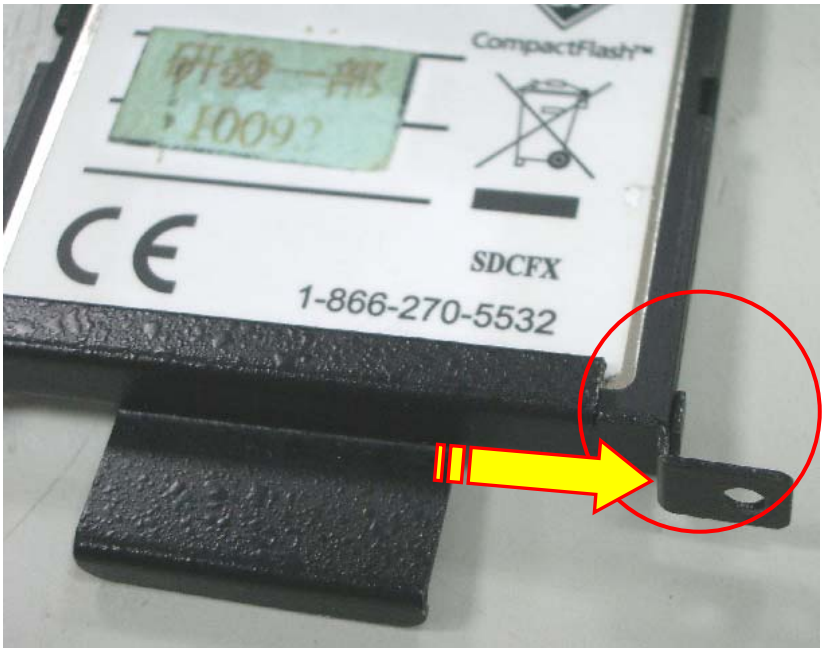
1. Unfasten two screws of CF bracket and then take out the CF card bracket.

2. Put the CF card into CF bracket.
   Please note that the direction of CF card and CF bracket





3. Push CF card to the bottom of bracket to stop the forwarding at the bend of bracket.



4. Push them into the CF slot of system machine and then fasten the two original screws to fix CF bracket.

2.5 RF Antenna Installation

1. Please find out all RF devices from below photo.

2. Take out antenna cables from packing bag and install them following below photo.

AR-B6002 Board

Fan-less with Intel ATOM Pineview + ICH8M

Board Guide

Manual Rev.: 1.0
Book Number: AR-B6002-2011.02.18

1 INTRODUCTION

1.1 Specifications

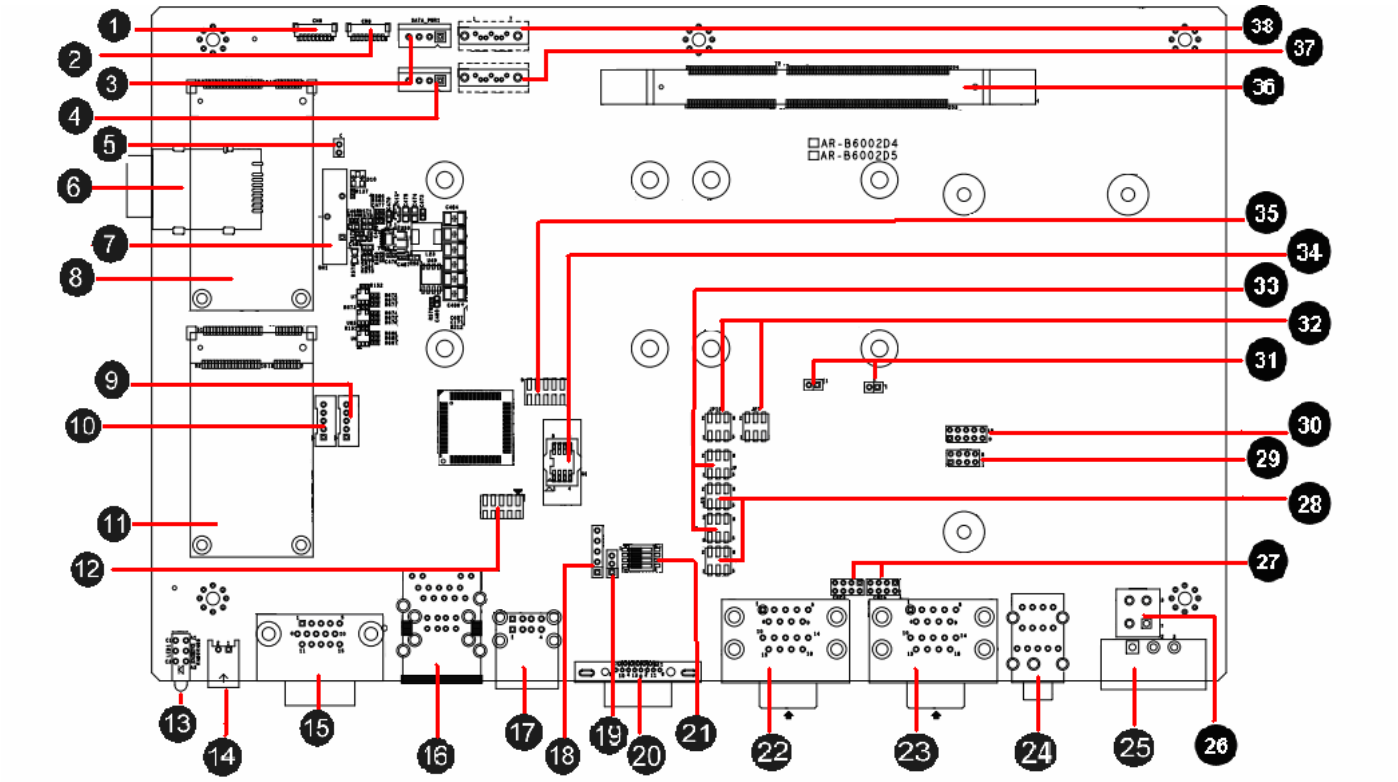
- Intel Atom D525/D425 1.66GHz
- 1 x SO-DIMM supports DDRIII up to 4GB(Memory DDR3 data transfer rates of 800 MT/s)
- 1 x VGA
- 6 x USB2.0
- 2 x SATA
- 1 x CF II
- 5 x RS-232
- 1 x GbE (Realtek RTL8111D)
- 1 x Line-out , 1 x MIC
- 1 x Canbus (Implementation ISO 11898)
- 8-bit GPIO with 4in / 4out
- Optional WiFi/ Bluetooth/ GPS/ 3.5G solution for selection
- Intelligent power management support standard 12V/24V car battery

2 H/W INFORMATION

This chapter describes the installation of AR-B6050. At first, it shows the Function diagram and the layout of AR-B6050. It then describes the unpacking information which you should read carefully, as well as the jumper/switch settings for the AR-B6050 configuration

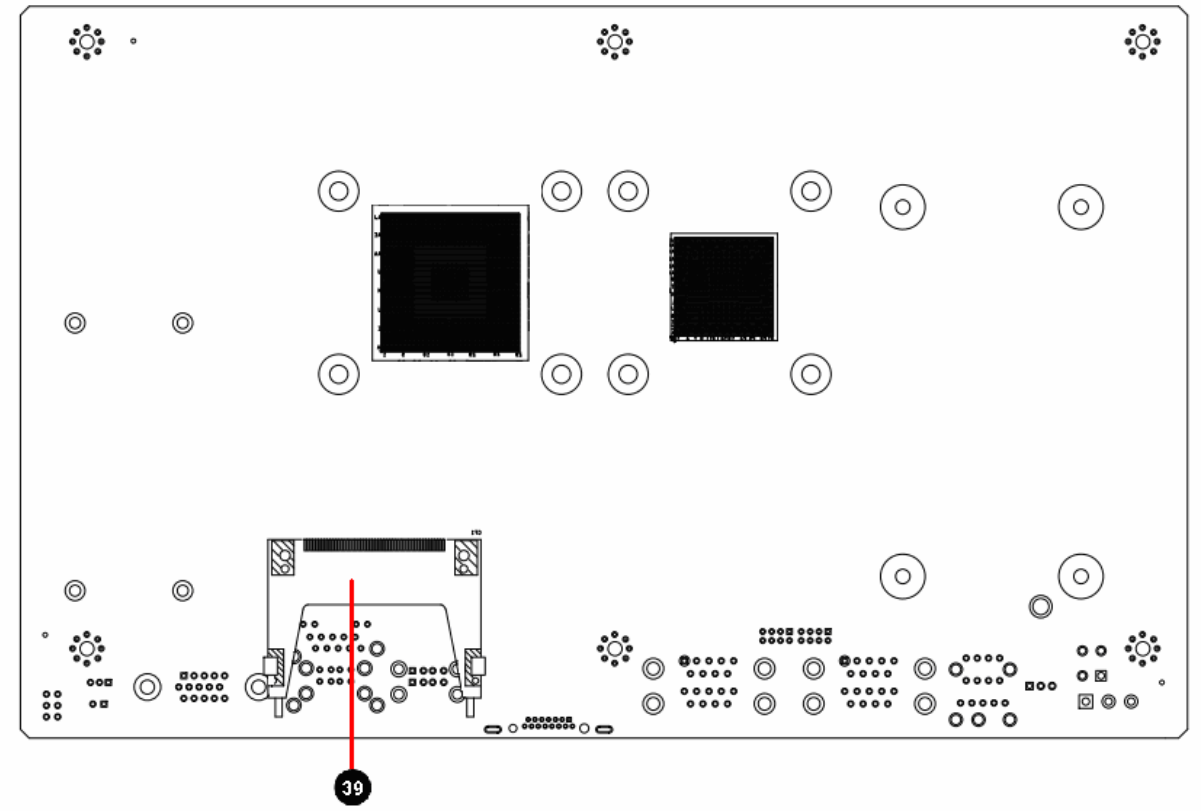
2.1 Locations of Connector and Jumper Setting

2.1.1 Locations (Top side)



1	CN6: Bluetooth connector	14	CN18: CANBUS connector	27	CN23: RI SELECT for COM1/2 CN24: RI SELECT for COM3/4
2	CN8: GPS connector	15	GPIO1: GPIO connector	28	JP8,JP11: RS-232 / RS-422 / RS-485 Selection for COM1/2
3	SATA power connector1	16	CN5: RJ45 + USB X 2 connector	29	CN25 (Reserve): RI SELECT for COM5/6
4	SATA power connector 2	17	CN7: USB connector	30	COM5 (Reserve): RS232 signal connector
5	CN2: CMOS clear	18	CN28: PIC Programming connector.	31	JP5,JP6 (Reserve): RS-485 Termination 120 ohm
6	CN13: SIM card slot	19	CN20: Setting Voltage level of Battery	32	JP7,JP10: RS-232 / RS-422 / RS-485 Selection for COM1/2
7	BH1: CMOS battery	20	VGA1:VGA connector	33	JP9,JP12: RS-232 / RS-422 / RS-485 Selection for COM1/2
8	Mini PCIe slot 1	21	SW1: DIP switch for power mode select	34	U8: SPI BIOS Socket
9	CN9 Internal USB	22	COM1&COM2: RS-232/422/485	35	CN21: BIOS Programmable HEADER
10	CN10 Internal USB	23	COM3&COM4: RS-232	36	DIMM1: DDR-3 SODIMM Socket
11	Mini PCIe slot 2	24	AUDIO1: AUDIO connector	37	SATA1: SATA device connector #1
12	CN17: FPGA programming header	25	PWR1: Power Input Terminal Block Connector	38	SATA2: SATA device connector #2.
13	LED1: Status LED	26	FUSE1: Fuse connector		

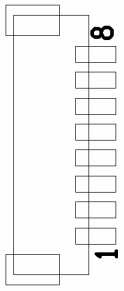
2.1.2 Locations (Bottom Side)



39	CF1

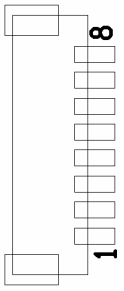
2.2 Connector and Jumper Setting Table

1. CN6: BLUETOOTH connector.



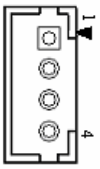
PIN	DEFINE
1	GND
2	USB_D+
3	USB_D-
4	+3.3V
5	LED
6	BT_ON
7	GND
8	+3.3V

2. CN8: GPS connector.



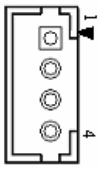
PIN	DEFINE
1	GND
2	USB_D+
3	USB_D-
4	+3.3V
5	LED
6	GPS_ON
7	GND
8	+3.3V

3. SATA_PWR1: SATA Power connector



PIN	DEFINE
1	+12V
2	GND
3	+3.3V
4	+5V

4. SATA_PWR2: SATA Power connector

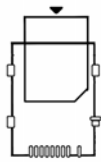


PIN	DEFINE
1	+12V
2	GND
3	+3.3V
4	+5V

5. CN2: Pin Header for clear CMOS

STATUS	SETTING
1-2	Clear CMOS

6. CN13: SIM Card Slot

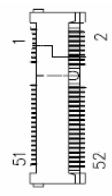


SIM Card Slot for 3G Module.

7. BH1: **CMOS battery holder**

CMOS battery holder

8. MINIPCIE1: **Mini PCI-E connector. (for 3.5G module)**

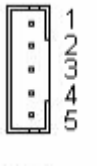


MINI PCI-E connector

9. CN9: Internal USB2.0 connector (Reserve)

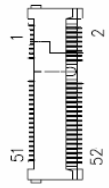
PIN	DEFINE
1	+5V
2	USB5-
3	USB5+
4	GND
5	GND

10. CN10: Internal USB2.0 connector (Reserve)



PIN	DEFINE
1	+5V
2	USB6-
3	USB6+
4	GND
5	GND

11. MINIPCIE2: **Mini PCI-E connector.**

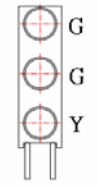


MINI PCI-E connector.

12. CN17: FPGA Programming HEADER.

FPGA programming header.

13. LED1: **Power State**



LED	SIGNAL
G	Status LED (2.5)
G	HDD LED
Y	Power LED

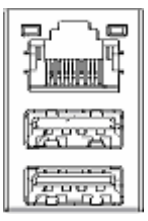
14. CN18: **CANBUS connector**

PIN	DEFINE
1	CAN_H
2	CAN_L

15. GPIO1: GPIO connector (2.8)

PIN	DEFINE	PIN	DEFINE
1	GPO0	2	GPO1
3	GPO2	4	GPO3
5	GND	6	GND
7	GND	8	GND
9	GND	10	GND
11	GPI4	12	GPI5
13	GPI6	14	GPI7
15	N.C		

16. CN5: **RJ45 + USB X 2 connector**



RJ45 connector for Gigabit Ethernet port #1.

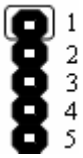
Upper: Port #2.

Lower: Port #1.

17. CN7: USB connector

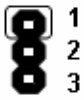
Upper: Port #4.
Lower: Port #3.

18. CN28: PIC Programming connector.



PIC programming connector.

19. CN20: Setting Voltage level of Battery



STATUS	SETTING
1-2	+24V
2-3	+12V (Default).

20. VGA1: D-SUB-15 female connector for VGA output

D-SUB-15 female connector for VGA output

21. SW1: DIP switch for power mode select (2.3)

Mode	1	2	3	4
0	ON	ON	ON	ON
1	ON	ON	ON	OFF
2	ON	ON	OFF	ON
3	ON	ON	OFF	OFF
4	ON	OFF	ON	ON
5	ON	OFF	ON	OFF
6	ON	OFF	OFF	ON
7	ON	OFF	OFF	OFF

22. COM1&COM2 : D-SUB-9P Male connector × 2 (2.7)

PIN	DEFINE	PIN	DEFINE
1	DCD /DT-	2	SIN /DT+
3	SOUT /422R+	4	DTR /422R-
5	GND	6	DSR
7	RTS	8	CTS
9	RI_12V		

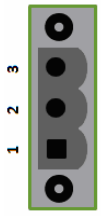
23. COM3&COM4: D-SUB-9P Male connector x 2

PIN	DEFINE	PIN	DEFINE
1	DCD	2	SIN
3	SOUT	4	DTR
5	GND	6	DSR
7	RTS	8	CTS
9	RI_12V		

24. AUDIO1: AUDIO connector

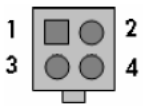
Color	SIGNAL
Blue	Remote Switch(2.4)
Green	Line Out
Pink	MIC IN

25. PWR1: Power Input Terminal Block Connector



PIN	DEFINE
1	12V / 24V
2	IGN
3	GND

26. FUSE1: Fuse connector



PIN	DEFINE
1,2	**Fuse Out**
3,4	**Fuse In**

27. CN23: RI SELECT for COM1/2
CN24: RI SELECT for COM3/4

STATUS	SETTING
RI# (Default)	1-2(COM1/COM3)
+12V	3-4(COM1/COM3)
RI# (Default)	5-6(COM2/COM4)
+12V	7-8(COM2/COM4)

28. JP8,JP11: RS-232 / RS-422 / RS-485 Selection for COM1/2 (2.7)

STATUS	SETTING
RS-232 (Default)	1-3 2-4
RS-422	3-5 4-6
RS-485	3-5 4-6

29. CN25: **RI SELECT for COM5/6 (Reserve)**

STATUS	SETTING
RI# (Default)	1-2(COM5)
+12V	3-4(COM5)
RI# (Default)	5-6(COM6)
+12V	7-8(COM6)

30. COM5: RS232 signal connector for port #5 (Reserve)

PIN	DEFINE	PIN	DEFINE
1	DCD #5	2	DSR #5
3	RX #5	4	RTS #5
5	TX #5	6	CTS #5
7	DTR #5	8	RI #5
9	GND	10	N.C

31. JP5,JP6: RS-485 Termination 120 ohm (Reserve)

STATUS	SETTING
Enable	short
Disable	open (Default)

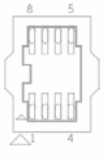
32. JP7,JP10: RS-232 / RS-422 / RS-485 Selection for COM1/2 (2.7)

STATUS	SETTING
RS-232 (Default)	1-2
RS-422	3-4
RS-485	5-6

33. JP9,JP12: RS-232 / RS-422 / RS-485 Selection for COM1/2 (2.7)

STATUS	SETTING
RS-232 (Default)	1-3 2-4
RS-422	3-5 4-6
RS-485	N / A

34. U8: SPI BIOS Socket

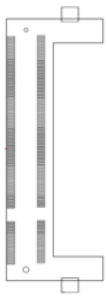


SPI BIOS Socket

35. CN21: BIOS Programmable HEADER.

PIN	DEFINE	PIN	DEFINE
1	CS0	2	+3.3V
3	MISO	4	HOLD
5	WP	6	CLK
7	GND	8	MOSI
9	N.C	10	N.C

36. DIMM1: **DDR-II SODIMM Socket.**



DDR-3 SODIMM Socket

37. SATA1: **SATA device connector #1.**

SATA device connector #1

38. SATA2: **SATA device connector #2.**

SATA device connector #2

39. CF1: Type-II compact flash card socket

+3.3V CF card only and UDMA mode supported

2.3 Power Subsystem

The AR-V6002 power subsystem converts the external DC input from vehicle to stable power rails for internal mother board, peripherals, and external I/O. The power subsystem can be configured by either an onboard switch SW1 or software to support various power off delay time. There are 9 power modes available for your application.

2.3.1 Definition:

1. Ignition: Ignition is a voltage input to command the power subsystem start a power on and off cycle. It is treated as ON when voltage is above 1.1 Volts and OFF as voltage is below 1.1 Volts. The maximum voltage input shall below 32 volts.
2. Remote Switch: Remote switch input is a Open/Close latch switch. It is an optional function when the power mode is set as Mode 2, 3 and 4. When you set the power mode as 5, 6 or 7, it works with ignition to power on or off the system. It will be treated as ON when the switch is CLOSED. It will be treated as OFF when the switch is OPEN.
3. Soft Off Delay: This is the delay time after ignition or remote switch is OFF till power subsystem sends a turn off command to the motherboard. If ignition or remote switch is turned ON again during this period, the power subsystem will cancel the OFF procedure and back to operating condition.
4. Hard Off Delay: This is the delay time after power subsystem detects the OS has been shut down till the standby power is turned off.

2.3.2 Power Mode Description

- Mode0: ATX function. System will be turned on and off by the remote switch. It operates as standard PC power button.
- Mode1: AT mode, Auto PWRBTN function. The power will be ON immediately when external power present. The power will be OFF immediately when external power is disconnected.
- Mode2: Smart mode.

A. Power on is controlled by **ignition (remote switch does not make any action to power on)**.

B. Power subsystem sends “ON” command to motherboard when ignition is on for more than 2 seconds.

C. Power subsystem will ignore the status change of ignition after ON command is sent to motherboard for 3 minutes. After this period, the Power Module will start to check its status. This can avoid an improper “OFF” process before the OS is

completely booted.

D. Power off is controlled by **remote switch or ignition. Remote switch** has higher priority than ignition. (Remote switch is optional).

E. Power subsystem sends “off” pulse to motherboard **5 seconds** after ignition is turned off or remote switch is pressed. (Soft Off delay)

F. Power subsystem will ignore the status change of ignition and remote switch during the “OFF” command is sent out and OS is completely shut down. This will avoid an improper ON process before the motherboard is completely shot off.

G. Hard off delay: **1 minutes,** During this period system can be turned on again if the off procedure already finished and ignition or remote switch is ON again.

- Mode 3 & 4: Same as Mode 2 except for different Soft Off and Hard Off delay.

- Mode 5: Same as mode 2 except that the power on is controlled by **remote switch.**

A. Power on is controlled by **remote switch (ignition must be turned on 2 seconds before remote switch is pressed)**.

B. Power subsystem sends off command to motherboard **5 seconds** after ignition or remote switch is turned off. (Soft Off delay)

- Mode6, Mode7: Same as Mode 2 except for different Soft Off and Hard Off delay.
- Mode 15: Software programmable mode. You can set the Soft Off Delay time, Hard Off Delay time and Power ON source by software Application Program Interface. Please refer to Chapter 4 for details.
- Others modes are reserved for test only.

Mode description:

Mode	Soft OFF Delay	Hard OFF delay	Power ON Control	Power OFF Control
0 (ATX)	No	No	Remote Switch	Remote Switch
1(AT)	No	No	DC on	DC off
2	5 seconds	1 minute	Ignition	Ignition / Remote Switch
3	1 minute	5 minutes	Ignition	Ignition / Remote Switch

4	30 minutes	2 hours	Ignition	Ignition / Remote Switch
5	5 seconds	1 minute	Remote Switch (2.4) (Ignition must be on first)	Ignition / Remote Switch
6	1 minute	5 minutes	Remote Switch (Ignition must be on first)	Ignition / Remote Switch
7	30 minutes	2 hours	Remote Switch (Ignition must be on first)	Ignition / Remote Switch
15 (Software control)	By user setting	By user setting	By user setting	Ignition / Remote Switch

Low power protection:

Power input monitoring(before system boot on, during runtime, during soft off delay): The Power smart function will constantly monitor the input voltage. If the input voltage is below **X Voltage (the standard might have 5% tolerance)**, the Smart Mode will not start the power on procedure. When Power smart function has ran in operation and the battery drops below **Y Voltage (with 5% tolerance)** more than 10 seconds the Power smart function will shut down the motherboard following the standard shut down procedure. If the input voltage recovers in 10 seconds over **Y Voltage (with 5% tolerance)** again, the Power smart function will continue to run. (Figure 4)if this happens, ignition shall be off and on again (Mode 2, 3, 4) or press the remote switch(Mode 5,6,7) if you want to turn on system again.

Important: Please make sure the CN20 jumper is set to the right setting which meet your vehicle power system. The power subsystem uses this setting to identify the voltage of your vehicle power system.

STATUS	SETTING
1-2	+24V system
2-3	+12V system (Default).

	For 12V car battery	For 24V car battery
X value (Minimum Start up voltage)	**11.2**	**23**
Y value (Auto shut down voltage)	**10.8**	**22.5**

2.4 Remote Switch

We provide a remote switch cable with latch switch. Use the remote switch cable can let user turn on and turn off system easier.

2.5 Status LED

The LED will flash a number of blink to state the status.

Mode 0 and 1:

LED will be constant ON when power output is ON. LED will be constant OFF when power output is off.

Mode 2 to 7 and mode 15(Smart ATX mode):

Each blink remains 500 milliseconds ON followed by a 500 ms OFF. Each Cycle will have a 5-second OFF in between.

flashing number	Status
0 (constant ON)	Power Output runs normally
1	Hard off mode
2	Standby mode (After power output is turned off until 5VSB is turned off)
3	Power soft off delay. (After ignition is turned off or remote switch is pressed until power output is turned off.)
4	Battery voltage low
5	System on/off fail. When motherboard cannot turn on or turn off after retry.
6	Mode 8 / 9 / 10 / 11 / 12 / 13 / 14, which means no function in current version.
6-128	Reserved

2.6 Fuse selection

AR-V6002FL has external fuse holder, user can swap fuse according to the application. We provide 7.5A fuse for 12V car battery, so that user's cable should be able to endure 7.5A at least.

2.7 COM1 / 2 to choose RS-232 / RS-485 / RS-422 by Jump setting

- JP7,JP8,JP9 setting to COM1
- JP10,JP11,JP12 setting to COM2

COM1 Type Selection

	JP7	JP8	JP9
RS-232	1 - 2	1 - 3 2 - 4	1 - 3 2 - 4
RS-422	3 - 4	3 - 5 4 - 6	3 - 5 4 - 6
RS-485	5 - 6	3 - 5 4 - 6	N / A

COM2 Type Selection

	JP10	JP11	JP12
RS-232	1 - 2	1 - 3 2 - 4	1 - 3 2 - 4
RS-422	3 - 4	3 - 5 4 - 6	3 - 5 4 - 6
RS-485	5 - 6	3 - 5 4 - 6	N / A

2.8 GPIO

GPO: Pin 1, Pin 2, Pin 3, Pin 4

Output voltage range: 5V~30V

Sink Current: Maximum 500mA each channel

Output Default set: Low

GPI: Pin 11, Pin 12, Pin 13, Pin 14

Logic High: 3V~32V

Logic Low: 0V~1.5V

3 BIOS SETTING

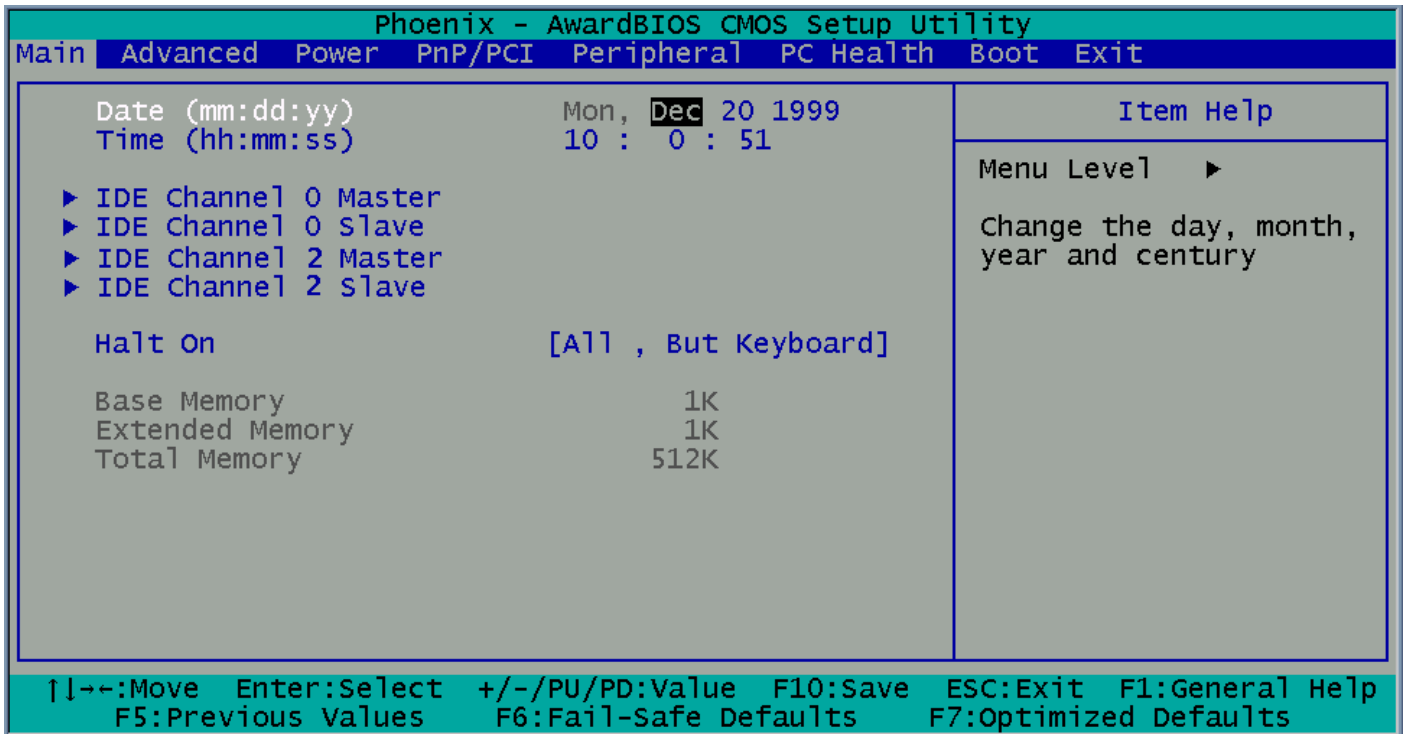
This chapter describes the BIOS menu displays and explains how to perform common tasks needed to get the system up and running. It also gives detailed explanation of the elements found in each of the BIOS menus. The following topics are covered:

- Main Setup
- Advanced Chipset Setup
- PnP/PCI Setup
- Peripherals Setup
- PC Health Setup
- Boot Setup
- Exit Setup

Once you enter the Award BIOS™ CMOS Setup Utility, the Main Menu will appear on the screen. Use the arrow keys to highlight the item and then use the <Pg Up> <Pg Dn> keys to select the value you want in each item.

3.1 Main Setup

The BIOS setup main menu includes some options. Use the [Up/Down] arrow key to highlight
the option, and then press the [Enter] key to select the item and configure the functions.


Phoenix - AwardBIOS CMOS Setup Utility
Main Advanced Power PnP/PCI Peripheral PC Health Boot Exit
Date (mm:dd:yy) Mon, Dec 20 1999
Time (hh:mm:ss) 10 : 0 : 51
IDE Channel 0 Master
IDE Channel 0 Slave
IDE Channel 2 Master
IDE Channel 2 Slave
Halt On [All , But Keyboard]
Base Memory 1K
Extended Memory 1K
Total Memory 512K
Item Help
Menu Level ▶
Change the day, month, year and century
↑↓→←:Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help
F5:Previous Values F6:Fail-Safe Defaults F7:Optimized Defaults

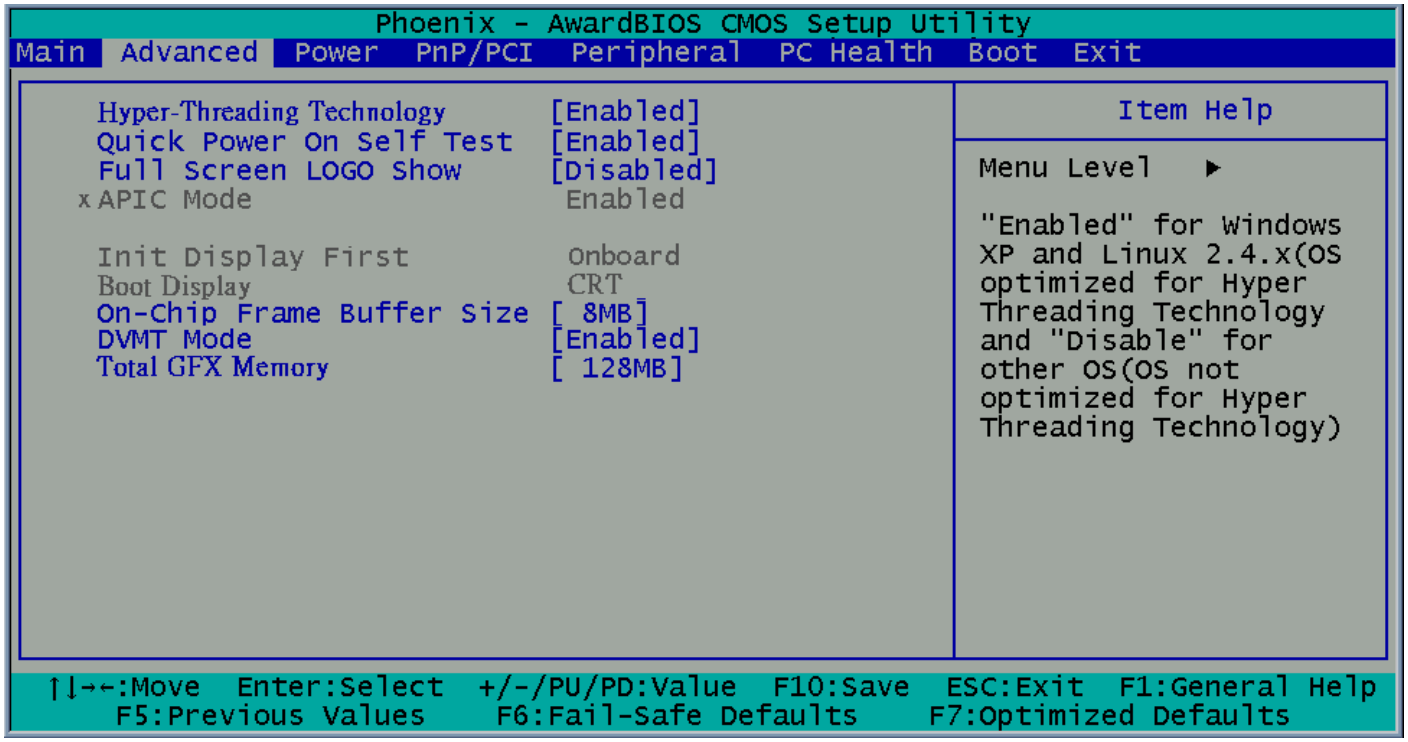
Note: The control keys are listed at the bottom of the menu. If you need any help with the item fields, you can press the <F1> key, and the relevant information will be displayed.

Item	Option	Description
System Date	Format : MM/DD/YYYY (month/day/year)	Set the system date. Note that the 'Day' automatically changes when you set the date.
System Time	Format: HH:MM:SS (hour:minute:second)	Set the system time.
IDE Channel 0 Master/Slave	N/A	The onboard SATA Ports support user connecting up to 2 SATA HDD. The first SATA Port is the "IDE Channel 0 Master" and the second is "IDE Channel 1 Master". BIOS will auto-detect the HDD type.

Halt On	All Errors, No Errors, All but keyboard.	Select the situation in which you want the BIOS to stop the POST process and notify you.

3.2 Advanced Chipset Setup

This section consists of configuration entries that allow you to improve your system performance, or modify some system features according to your preference. Some entries are required and reserved by the board's design.

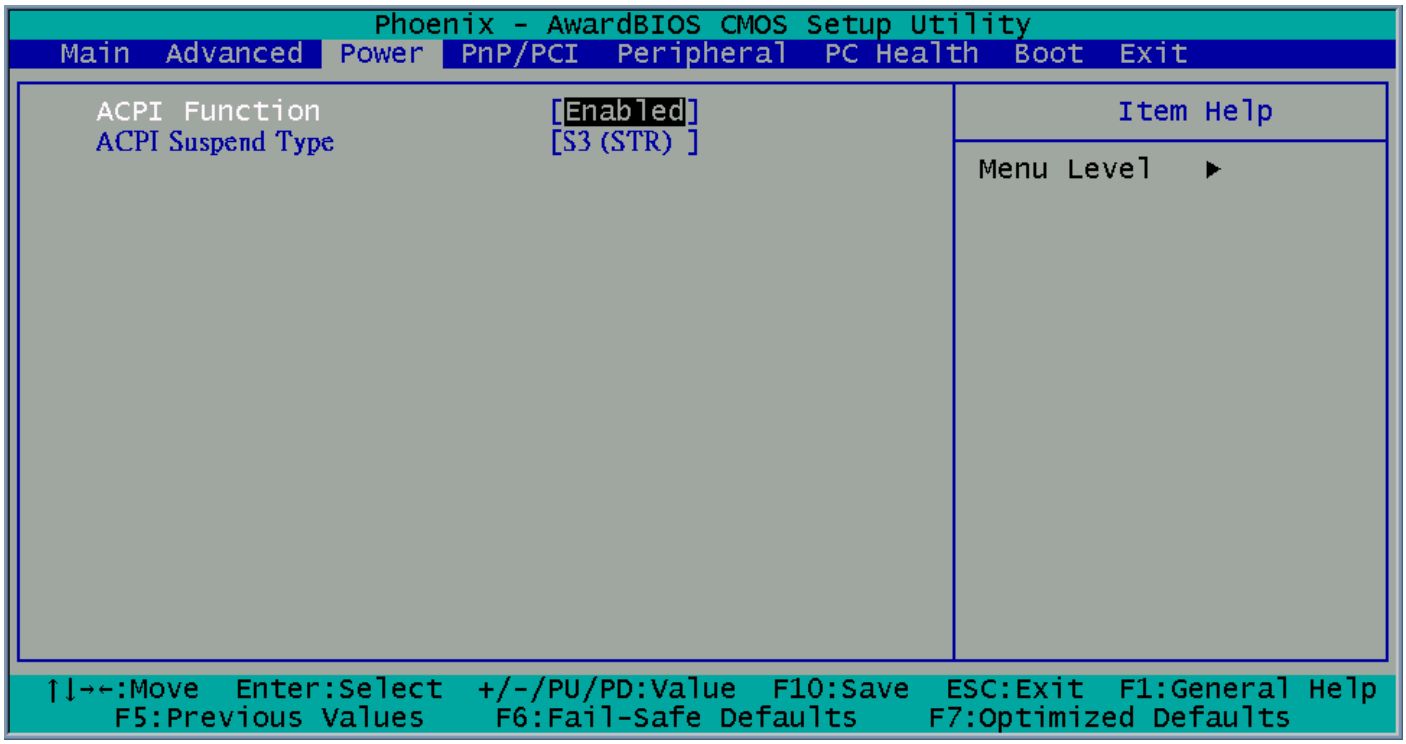

Phoenix - AwardBIOS CMOS Setup Utility
Main Advanced Power PnP/PCI Peripheral PC Health Boot Exit
Hyper-Threading Technology [Enabled]
Quick Power On Self Test [Enabled]
Full Screen LOGO Show [Disabled]
x APIC Mode Enabled
Init Display First Onboard
Boot Display CRT
On-Chip Frame Buffer Size [8MB]
DVMT Mode [Enabled]
Total GFX Memory [128MB]
Item Help
Menu Level ▶
"Enabled" for Windows XP and Linux 2.4.x(OS optimized for Hyper Threading Technology and "Disable" for other OS(OS not optimized for Hyper Threading Technology)
↑↓→←:Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help
F5:Previous Values F6:Fail-Safe Defaults F7:Optimized Defaults

Note: The control keys are listed at the bottom of the menu. If you need any help with the item fields, you can press the <F1> key, and the relevant information will be displayed.

Option	Choice	Description
Hyper-Threading Technology	Enabled Disabled	Enable for Windows XP and Linux Disable for other OS.
Quick Power On Self Test	Enabled Disabled	This category speeds up the Power On Self Test (POST) after you have powered on the computer. If it is set to Enabled, the BIOS will shorten or skip some check items during POST.
Full Screen Logo Show	Enabled Disabled	Select Enabled to show the full screen logo if you have an add-in BIOS.
On-Chip Frame Buffer Size	1Mb 8Mb	This Item is for setting the Frame Buffer (Share system memory as display

		memory).
DVMT mode	Enabled Disabled	This item sets the mode for dynamic video memory thechology
Total GFX Memory	128MB 256MB MAX	This item sets the mode for GFX video memory

3.3 Power Setup

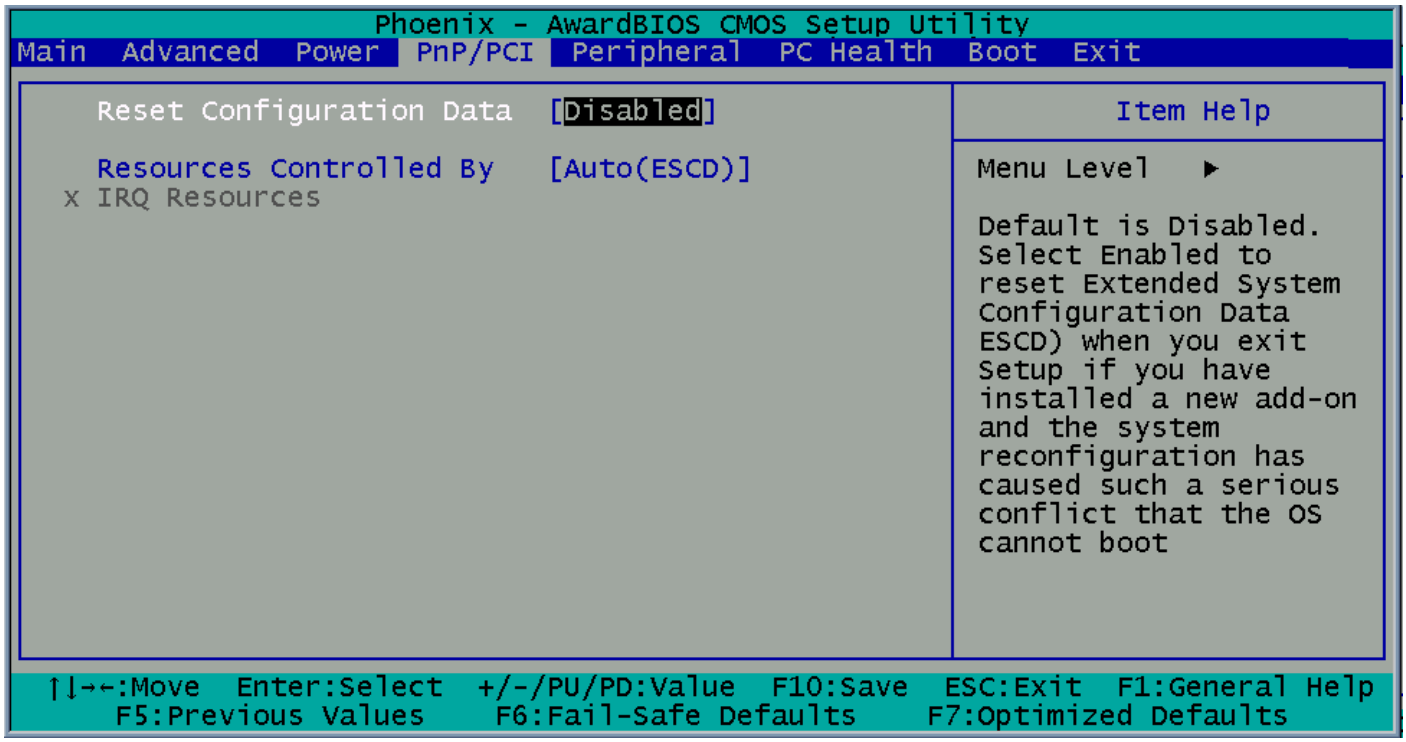

Phoenix - AwardBIOS CMOS Setup Utility
Main Advanced Power PnP/PCI Peripheral PC Health Boot Exit
ACPI Function [Enabled]
ACPI Suspend Type [S3 (STR)]
Item Help
Menu Level ▶
↑↓→←:Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help
F5:Previous Values F6:Fail-Safe Defaults F7:Optimized Defaults

Note: The control keys are listed at the bottom of the menu. If you need any help with the item fields, you can press the <F1> key, and the relevant information will be displayed.

Item	Option	Description
ACPI Function	Enabled	ACPI System Support
ACPI Suspend Type	S3 S1	ACPI S1/S3 Sleep State.

3.4 PnP/PCI Setup

The option configures the PCI bus system. All PCI bus system on the system use INT#, thus
all installed PCI cards must be set to this value.


Phoenix - AwardBIOS CMOS Setup Utility
Main Advanced Power PnP/PCI Peripheral PC Health Boot Exit
Reset Configuration Data [Disabled]
Resources Controlled By [Auto(ESCD)]
x IRQ Resources
Item Help
Menu Level ▶
Default is Disabled. Select Enabled to reset Extended System Configuration Data ESCD) when you exit Setup if you have installed a new add-on and the system reconfiguration has caused such a serious conflict that the OS cannot boot
↑↓→←:Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help
F5:Previous Values F6:Fail-Safe Defaults F7:Optimized Defaults

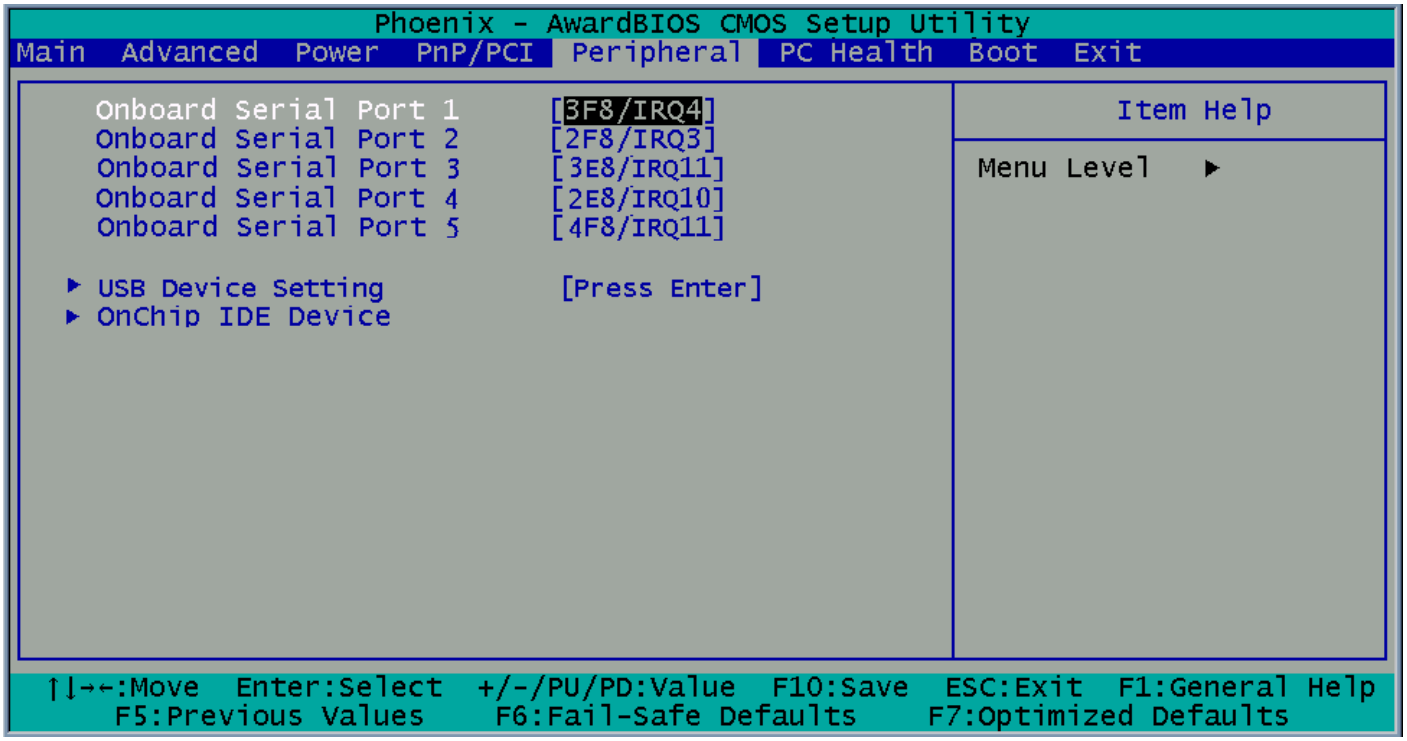
Note: The control keys are listed at the bottom of the menu. If you need any help with the item fields, you can press the <F1> key, and the relevant information will be displayed.

Item	Option	Description
Reset Configuration Data	Enabled Disabled	Normally, you leave this field Disabled. Select Enabled to reset Extended System Configuration Data (ESCD) when you exit Setup. If you have installed a new add-on and the system reconfiguration has caused such a serious conflict, then the operating system cannot boot.
Resources Controlled By	Auto(ESCD) Manual	The Award Plug and Play BIOS has the capacity to automatically configure all of the boot and Plug and Play compatible devices. However, this capability means absolutely

		nothing unless you are using a Plug and Play operating system such as Windows 95. If you set this field to “manual,” then you may choose specific resources by going into each of the submenus.
IRQ Resources	N/A	When resources are controlled manually, assign a type to each system interrupt, depending on the type of the device that uses the interrupt

3.5 Peripherals Setup

This option controls the configuration of the board's chipset. Control keys for this screen are
the same as for the previous screen.

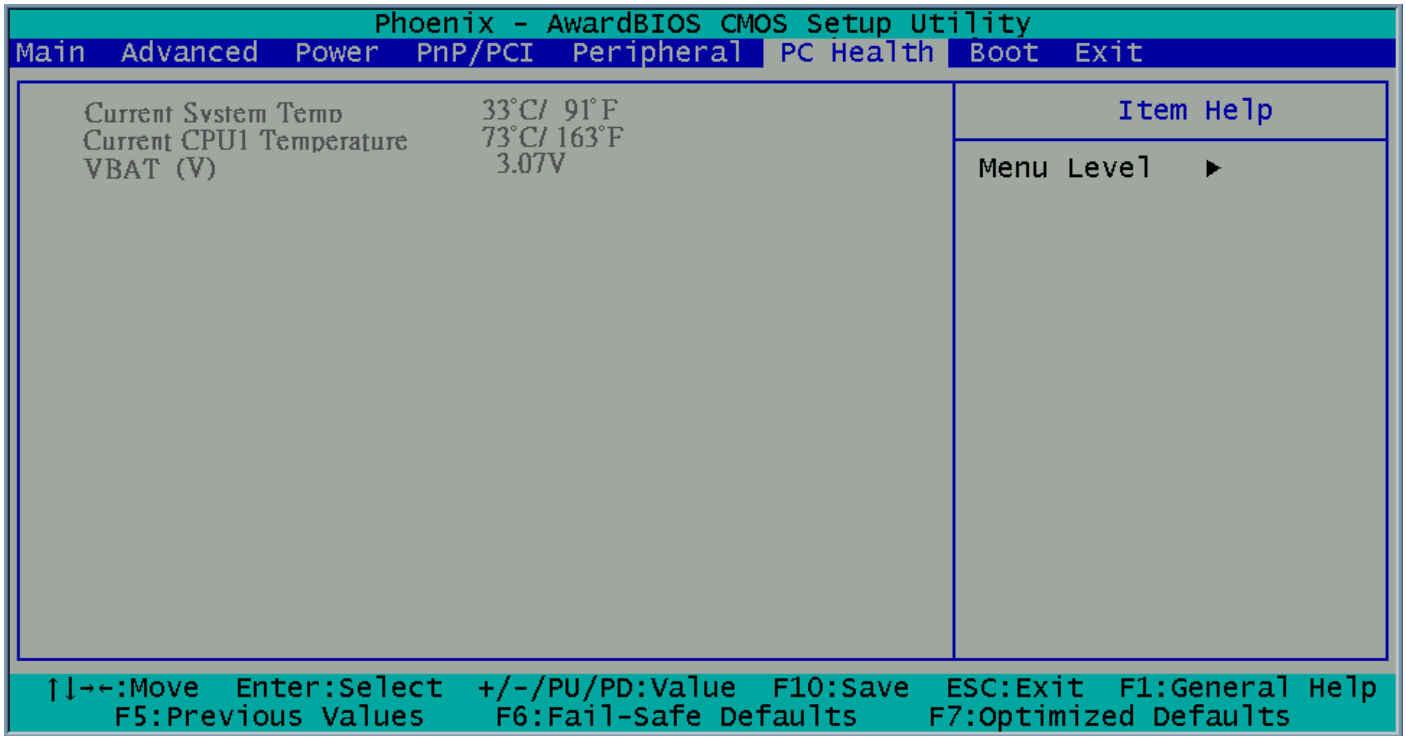

Phoenix - AwardBIOS CMOS Setup Utility
Main Advanced Power PnP/PCI Peripheral PC Health Boot Exit
Onboard Serial Port 1 [3F8/IRQ4]
Onboard Serial Port 2 [2F8/IRQ3]
Onboard Serial Port 3 [3E8/IRQ11]
Onboard Serial Port 4 [2E8/IRQ10]
Onboard Serial Port 5 [4F8/IRQ11]
USB Device Setting [Press Enter]
OnChip IDE Device
Item Help
Menu Level ▶
↑↓→←:Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help
F5:Previous Values F6:Fail-Safe Defaults F7:Optimized Defaults

Note: The control keys are listed at the bottom of the menu. If you need any help with the item fields, you can press the <F1> key, and the relevant information will be displayed.

Option	Choice	Description
Onboard Serial Port 1 **Onboard Serial Port 2** **Onboard Serial Port 3** **Onboard Serial Port 4** **Onboard Serial Port 5**	Serial Port 1: 3F8 / IRQ4 Serial Port 2: 2F8 / IRQ3 Serial Port 3: 3E8 / IRQ11 Serial Port 4: 2E8 / IRQ10 Serial Port 5: 4F8 / IRQ11	Select an address and the corresponding interrupt for each serial port.
USB Device Setting		Select your system contains a Universal Serial Bus (USB) controller and you have USB peripherals.
On chip IDE DEVICE		The integrated peripheral controller contains an IDE interface with support for two IDE channels.

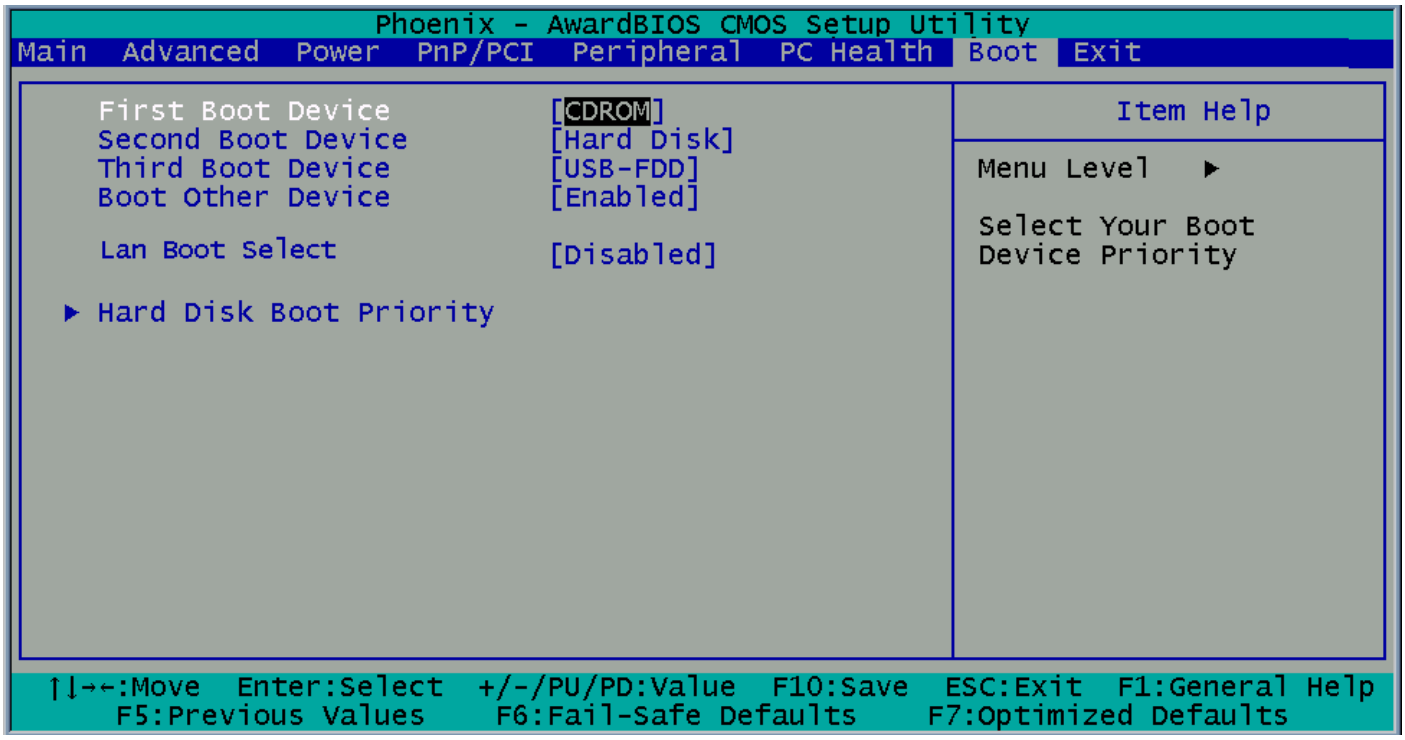
3.6 PC Health Setup

This section shows the parameters in determining the PC Health Status. These parameters
include temperatures, fan speeds, and voltages.


Phoenix - AwardBIOS CMOS Setup Utility
Main Advanced Power PnP/PCI Peripheral PC Health Boot Exit
Current System Temp 33°C/ 91°F
Current CPU1 Temperature 73°C/ 163°F
VBAT (V) 3.07V
Item Help
Menu Level ▶
↑↓→←:Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help
F5:Previous Values F6:Fail-Safe Defaults F7:Optimized Defaults

3.7 Boot Setup

This option allows user to select sequence/priority of boot device(s) and Boot from LAN.

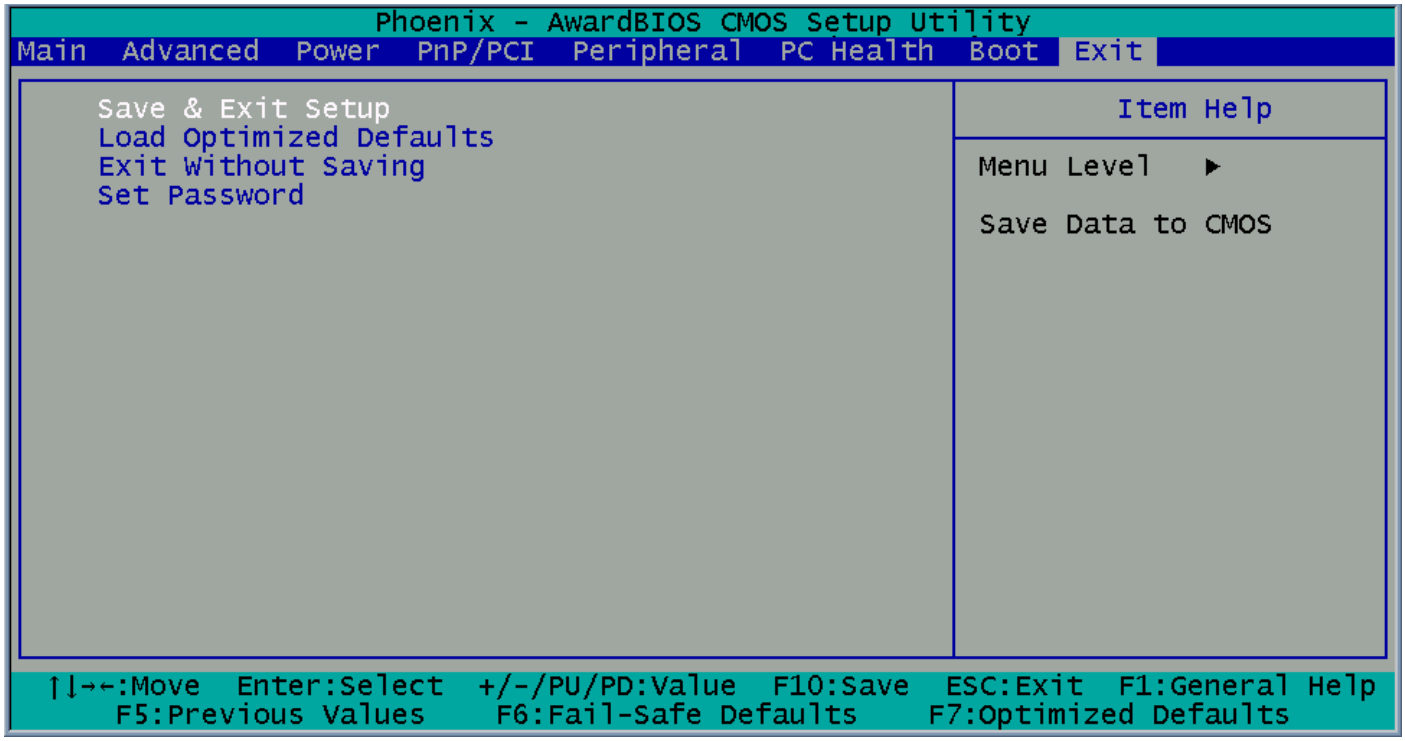

Phoenix - AwardBIOS CMOS Setup Utility
Main Advanced Power PnP/PCI Peripheral PC Health Boot Exit
First Boot Device [CDROM]
Second Boot Device [Hard Disk]
Third Boot Device [USB-FDD]
Boot Other Device [Enabled]
Lan Boot Select [Disabled]
Hard Disk Boot Priority
Item Help
Menu Level ▶
Select Your Boot Device Priority
↑↓→←:Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help
F5:Previous Values F6:Fail-Safe Defaults F7:Optimized Defaults

Note: The control keys are listed at the bottom of the menu. If you need any help with the item fields, you can press the <F1> key, and the relevant information will be displayed.

Option	Choice	Description
First / Second / Third Boot Device/Other Boot Device	Hard Disk CDROM USB-FDD USB-CDROM LAN Disabled	The BIOS attempts to load the operating system from the devices in the selected sequence.
LAN Boot Select	Enabled Disabled	These fields allow the system to search for an OS from LAN.
Hard Disk Boot Priority	N/A	These fields set the Boot Priority for each Hard Disk.

3.8 Exit Setup

This option is used to exit the BIOS main menu and change password.


Phoenix - AwardBIOS CMOS Setup Utility
Main Advanced Power PnP/PCI Peripheral PC Health Boot Exit
Save & Exit Setup
Load Optimized Defaults
Exit Without Saving
Set Password
Item Help
Menu Level ▶
Save Data to CMOS
↑↓→←:Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help
F5:Previous Values F6:Fail-Safe Defaults F7:Optimized Defaults

Note: The control keys are listed at the bottom of the menu. If you need any help with the item fields, you can press the <F1> key, and the relevant information will be displayed.

Option	Choice	Description
Save & Exit Setup	Press <Enter> on this item to confirm: **Save to CMOS and EXIT (Y/N)? Y**	Press “Y” to store the selections made in the menus in CMOS – a special section of the memory that stays on after you turn your system off. The next time you boot your computer, the BIOS configures your system according to the setup selections stored in CMOS. After saving the values, the system will restart.

Load Optimized Defaults	When you press <Enter> on this item, you will see a confirmation dialog box with a message like this: **Load Optimized Defaults (Y/N)? N**	Press 'Y' to load the default values that are factory-set for optimal-performance system operations.
Exit Without Saving	Press <Enter> on this item to confirm: **Quit without saving (Y/N)? Y**	This allows you to exit Setup without storing any changes in CMOS. The previous selections remain in effect. This will exit the Setup utility and restart your computer.
Set Password	Press <Enter> on this item to confirm: **ENTER PASSWORD:**	When a password has been enabled, you will be prompted to enter your password every time you try to enter Setup. This prevents unauthorized persons from changing any part of your system configuration. Type the password, up to eight characters in length, and press <Enter>. The password typed now will clear any previous password from the CMOS memory. You will be asked to confirm the password. Type the password again and press <Enter>. You may also press <Esc> to abort the selection and not enter a password. To disable a password, just press <Enter> when you are prompted to enter the password. A message will confirm that the password will be disabled. Once the password is disabled, the system will boot and you can enter Setup freely.

4 SOFTWARE INSTALLATION AND PROGRAMMING GUIDE

4.1 Introduction

4.1.1 CAN bus

Overview

The CAN bus APIs provide interfaces to CAN bus subsystem. By invoking these APIs, programmers can implement applications which have the functions listed below:

1. Set the BAUD rate.
2. Send the CAN packages over the CAN bus.
3. Receive the CAN packages via the CAN bus hardware interface.

In this CAN bus API package, we provides:

1. On Linux platform:
   Linux driver module of CAN bus subsystem and the driver load / unload scripts.
   On Windows platform:
   Device driver and install program of CAN bus subsystem.
2. API header file.
   API libraries in static library format and shared library format.
3. CAN bus test utility and its source code.

Installation Procedure of CAN Bus Driver

On Linux platform:

1. Change to the ‘root’ user account.
2. In the ‘driver’ directory, execute the script ‘modld’.
3. Execute ‘lsmod’.
4. Make sure ‘6002’ is in the module list.
5. If the driver is no longer needed, execute the script ‘modul’ to unload the driver.

On Windows platform:

1. In the driver directory, execute the ‘setup.exe’ program.

The CAN bus APIs

Before executing the applications which invoke the CAN bus APIs, users should make sure that the Linux device driver or the Windows device driver of CAN bus has been installed.

On Linux platform, after successfully installing the device driver, a character device node named “/dev/can0” will be created automatically. The APIs open the device node “/dev/can0” implicitly so acquiring a file descriptor of “/dev/can0” by users is not ncecssary. In order not to degrade the performance of the CAN bus subsystem, the device node “/dev/can0” is limited to be opened at most once at any moment, i.e., if application A accesses CAN bus via the APIs, the application B which either tries to open ‘/dev/can0’ or uses CAN bus API will result in failure.

On Windows platform, after successfully installing the device driver, there is a device which shows ‘Device Driver for the AR-B6002 card’ in the ‘Device Manager’. The APIs on Windows platform open this device implicitly. User can call the APIs directly without opening the CAN Bus subsystem device.

CAN Message Format

```
// TPE DEFINE
typedef   char                i8;
typedef   unsigned char       u8;
typedef   short               i16;
typedef   unsigned short      u16;
typedef   unsigned long       u32;
typedef   int                 i32;

typedef struct timeval {
   long tv_sec;
   long tv_usec;
} timeval;

      typedef   struct {
            i32             flags;
            i32             cob;
            u32             id;
            struct timeval  timestamp;
            i16             length;
```

```
    u8          data[8];
} canmsg_t;
```

To transmit a CAN package, the programmer has to fill in the fields in the variable of type canmsg_t and pass this canmsg_t variable as an argument to invoke the APIs. The fields in CAN message are described below:

flags:

This field holds the information of message type. Programmers can set the message type as:

1. Standard Data Frame:

```
canmsg_t msg;    // Declare a variable 'msg' of type 'canmsg_t'
msg.flags = 0;   // Setting the flags field to 0 defines the 'msg' as an
                 // ordinary standard data frame.
```

2. Remote Transmission Request in Standard Data Frame format

```
canmsg_t msg;
msg.flags = 0;     // Setting the flags field to 0 defines the 'msg' as an
                   // ordinary standard data frame.
msg.flags = msg.flags | MSG_RTR;    // Enable the RTR flag.
```

3. Extended Data Frame:

```
canmsg_t msg;
msg.flags = 0 | MSG_EXT;    // Setting the EXT flag in the 'flags' field
                            // defines the 'msg' as an extended data frame.
```

4. Remote Transmission Request in Extended Data Frame format

```
canmsg_t msg;
msg.flags = 0 | MSG_EXT | MSG_RTR;    // Enable the RTR flag.
```

cob:

This field is reserved for holding a message communication object number.

id:

CAN message ID.

timestamp:

When a CAN package is received, the CAN device driver will annotate a timestamp to the timestamp field in the canmsg_t variable and return this canmsg_t variable to the caller.

length:

The number of the data bytes which are sent or received in the ‘data’ field of CAN message. This field is necessary while transmitting a Standard or Extended Data Frame. Programmers have to explicitly set up this field. The length of data is 0~8.

For example:

```
canmsg_t msg;

msg.data[0] = 0xa1;
msg.data[1] = 0xb2;
msg.data[2] = 0xc3;
msg.length = 3;
```

data:

The byte array which holds the message data.

4.1.2 GPIO and Watchdog

Overview

AR-B6002 provides both a GPIO interface and a Watchdog timer. Users can use the GPIO and Watchdog APIs to configure and to access the GPIO interface and the Watchdog timer. The GPIO has four input pins and four output pins. The Watchdog timer can be set to 1~255 seconds. Setting the timer to zero disables the timer. The remaining seconds of the timer to reboot can be read from the timer.

In this GPIO and Watchdog package, on Linux and Windows platform, we provide:

1. API source code.
2. GPIO and Watchdog test utility and the utility source code.

4.1.3 Power Subsystem

Overview

When the AR-B6002 is at Power Mode 15, the Power Subsystem APIs can be used to get and set the configuration of power subsystem. By invoking the Power Subsystem APIs, the users can:

1. Get the current status of ignition (ON or OFF).
2. Set the Power-On mode. This setting will be kept in the power subsystem and will take effect at next system boot.
3. From the power subsystem, get the stored setting of Power-On mode.
4. Get or set the time of Hard Off delay in seconds or in minutes.
5. Get or set the time of Soft Off delay in seconds or in minutes
6. Get the battery voltage.
7. Get the version number of the firmware of the Power Subsystem.
8. Set the Hard Off delay and Soft Off delay to the default value.

The power subsystem connects to the main system via the COM6. The Linux's default supported COM interfaces are COM1~COM4. The Power Subsystem APIs implicitly communicate with power subsystem through COM6. Users must take extra steps to configure Linux kernel in order to support COM6. Please refer to Appendix A for more information. Users don't need extraordinary setup on Windows platform to support COM6.

In this Power Subsystem package, we provide:

1. The APIs to access power subsystem and the source code of the APIs.
2. The utility and source code to monitor and set up power modes, ignition status, and power-off time.
3. On Linux platform, the Makefile to create API libraries and utility.

4.2 File Descriptions

4.2.1 CAN Bus

On Linux platform:

1. AGC_LIB.h
   The header file of the API and macro definitions.
2. errcode.h
   The macro definitions of returned error code.
3. libAGC_LIB.a
   The API library in static library format.
4. libAGC_LIB.so
   The API library in shared library format.
5. main.c
   The source code of the utility.
6. Makefile

On Windows platform:

1. AR-B6002.h
   The header file of the APIs and macro definition. This header file is an aggregate header which includes APIs declarations and macros for CAN Bus, GPIO, Watchdog, and Power Subsystem.
2. AR-B6002.lib
   The API library in static library format. This library is an aggregate library. It includes APIs for CAN Bus, GPIO, Watchdog, and Power Subsystem.
3. AR-B6002.dll
   The API library in dynamically linked library format. This library is an aggregate library. It includes APIs for CAN Bus, GPIO, Watchdog, and Power Subsystem.
4. CAN_DEV_FUNC.h
   The header file for the CAN bus test utility.
5. errcode.h
   The macro definitions of returned error code.
6. CAN_DEV.cpp
   The source code of the CAN bus test utility.

4.2.2 GPIO and Watchdog

On Linux platform:

1. sio_acce.c
   The source code of the Watchdog and GPIO APIs for accessing the SuperIO.
2. sio_acce.h
   This file includes the declarations of the APIs and macro definitions.
3. main.c
   The source code of the utility.
4. Makefile

On Windows platform:

1. AR-B6002.h
   The header file of the APIs and macro definition. This header file is an aggregate header which includes APIs declarations and macros for CAN Bus, GPIO, Watchdog, and Power Subsystem.
2. AR-B6002.lib
   The API library in static library format. This library is an aggregate library. It includes APIs for CAN Bus, GPIO, Watchdog, and Power Subsystem.
3. AR-B6002.dll
   The API library in dynamically linked library format. This library is an aggregate library. It includes APIs for CAN Bus, GPIO, Watchdog, and Power Subsystem.
4. errno.h
   The macro definitions of returned error code.
5. GPIO_Watchdog.cpp
   The source code of the utility.

4.2.3 Power Subsystem

On Linux platform:

1. pwr_acce.c
   The source code of the APIs for accessing the power subsystem.
2. pwr_acce.h
   This file includes the declarations of the APIs and macro definitions.
3. main.c
   The source code of the utility.
4. Makefile

On Windows platform:

1. AR-B6002.h
   The header file of the APIs and macro definition. This header file is an aggregate header which includes APIs declarations and macros for CAN Bus, GPIO, Watchdog, and Power Subsystem.
2. AR-B6002.lib
   The API library in static library format. This library is an aggregate library. It includes APIs for CAN Bus, GPIO, Watchdog, and Power Subsystem.
3. AR-B6002.dll
   The API library in dynamically linked library format. This library is an aggregate library. It includes APIs for CAN Bus, GPIO, Watchdog, and Power Subsystem.
4. PWRPIC.h
   The main haeder file for the GUI.
5. PWRPIC.cpp
   The definitions of the class declared in ‘PWRPIC.h’.
6. PWRPICDlg.h
   The main header file for the class of performing the Power Subsystem access.
7. PWRPICDlg.cpp
   The definitions of the classs declared in ‘PWRPICDlg.h’.
8. SerialPort.h
   The header file for functions which access the COM port.
9. SerialPort.cpp
   The definitions of the functions declared in ‘SerialPort.h’.

4.3 API List and Descriptions

4.3.1 CAN Bus

1. Syntax:

unsigned int sendCanMessages(canmsg_t *buffer, u8 count)

Description: This function sends out CAN packages over the CAN bus.

Parameters: If there is more than one CAN package to send, these CAN packages are stored in a ‘canmsg_t’ array. This function sends out packages in a sequential fashion. The memory address of the first CAN package to send is pointed at by the parameter ‘buffer’. The number of CAN packages to send is indicated by the parameter ‘count’. If the resource of sending out the CAN packages is temporarily unavailable, the process which invokes this function will be blocked (Block I/O) until the resource is available again.

Return Value: If this function sends out the packages successfully, it returns ERROR_API_SUCC. If this function fails to open the CAN device node, it returns ERROR_API_CAN_OPEN_FAIL. If this function has any problem with sending out the CAN packages, it returns ERROR_API_CANSENDMESSAGES.

Here is an example:
If the CAN packages in the array ‘canAry[]’ have been initialized. The code listed below will send out the CAN packages in the ‘canAry[]’ over the CAN bus.

```
unsigned int result = 0;
canmsg_t canAry[30];
/* …
  Initialize the CAN packages in the canAry[30]
*/
  result = sendCanMessages( canAry, 30 );
  if( result == ERROR_API_CANSENDMESSAGES ||
      result == ERROR_API_CAN_OPEN_FAIL )
  fprintf( stderr, “Send CAN package error!\n”);
```

2. **Syntax:**

```
unsigned int getCanMessages( canmsg_t *buffer, u8 count )
```

Description: This function receives CAN packages from the CAN bus subsystem.

Parameters: This function stores received CAN packages sequentially at an array of type ‘canmsg_t’. The number of packages to receive is indicated by the parameter ‘count’. Before finishing receiving ‘count’ packages, the process which invokes this function will be temporarily blocked (Block I/O) if there is no incoming CAN package.

Return Value: If this function receives the packages successfully, it returns ERROR_API_SUCC. If this function fails to open the CAN device node, it returns ERROR_API_CAN_OPEN_FAIL. If this function has any problem with receiving the CAN packages, it returns ERROR_API_CANGETMESSAGES.

Here is an example:
If the array ‘canAry[]’ of type ‘canmsg_t’ has been declared and allocated. The code listed below will receive 30 CAN packages from the CAN bus subsystem and stores the packages in the ‘canAry[]’.

```
unsigned int result = 0;
canmsg_t canAry[30];

result = getCanMessages( canAry, 30 );
  if( result == ERROR_API_CANGETMESSAGES ||
      result == ERROR_API_CAN_OPEN_FAIL )
  fprintf( stderr, “Send CAN package error!\n”);
```

3. **Syntax:**

```
unsigned int configCan( i32 baud )
```

Description: This function sets up the speed (Baud rate) of sending and receiving CAN packages.

Parameters: The parameter ‘baud’ could be: (the unit is Kbps)
10 , 20 , 50 , 100 , 125 , 250 , 500 , 800 , 1000

The default speed is 125 Kbps.

Return Value: This function returns ERROR_API_SUCC if it set the Baud rate successfully. If this function fails to open the CAN device node, it returns ERROR_API_CAN_OPEN_FAIL. If the inputted Baud rate is not any one of the Baud rate listed above, it will return ERRMSG(ERROR_API_CANCONFIG, ERROR_GEN_INPUT_DATA). If it has any other problem with setting the Baud rate, it returns ERROR_GEN_DEVICE_FAIL.

4.3.2 GPIO and Watchdog

GPIO

1. Syntax:

```
i32 getInChLevel( i32 channel, u8 *val )
```

Description: Get the value of GPIO Input and put the value at *val.

Parameters:

I. The parameter ‘channel’ indicates the GPIO Input pins to show. Users can use the macros GPI0, GPI1, GPI2, GPI3 to indicate the GPIO Input channel. For example:

```
getInChLevel( GPI2, &val);    // Indicate the GPIO Input channel 2
getInChLevel( GPI0 | GPI3, &val);    // Indicate the GPIO Input
                                     // channel 0 and channel 3
```

II. The parameter ‘val’ is an unsigned character pointer. The function puts the values of the indicated GPIO channels at the memory pointed by ‘val’. The bit 0 of *val shows the value of GPIO Input channel 0. The bit 1 of *val shows the value of GPIO Input channel 1. Other bits show the corresponding GPIO Input channels. Because there are only four channels, bit 4 ~ bit 7 of *val are always zero.

Here is an example:
If GPIO Input channel 1 and channel 3 are both 1.

```
unsigned char ch;
getInChLevel( GPI1|GPI3, &ch );
```

The returned value of variable ‘ch’ is 0xa.

Return Value: If the function gets the values successfully, it returns 0. If any error, it returns –1.

2. Syntax:

i32 setOutChLevel(i32 channel, u8 val)

Description: Set the value of GPIO Output according to the variable ‘val’.

Parameters:

I. The parameter ‘channel’ indicates the GPIO Output pins to set. Users can use the macros GPO0, GPO1, GPO2, GPO3 to indicate the GPIO Output channels.

II. The parameter ‘val’ indicate the value to be set to GPIO Output channel. The acceptable values is limited to 0 and 1.

For example:

```
/* Setting the GPIO Output channel 2 to 1 */
setOutChLevel( GPO2, 1 );

/* Setting the GPIO Output channel 0 and channel 3 to 0 */
getInChLevel( GPO0 | GPO3, 0 );
```

Return Value: If the function sets the values successfully, it returns 0. If any error, it returns –1.

3. Syntax:

i32 getOutchLevel(i32 channel, u8 *val)

Description: Get the value of GPIO Output and put the value at *val.

Parameters:

I. The parameter ‘channel’ indicates the GPIO Output pins to show. Users can use the macros GPO0, GPO1, GPO2, GPO3 to indicate the GPIO Output channel.
For example:

```
getOutChLevel( GPO2, &val);    // Indicate the GPIO Output channel 2

/* Indicate the GPIO Output channel 0 and channel 3. */
getOutChLevel( GPO0 | GPO3, &val);
```

II. The parameter ‘val’ is an unsigned character pointer. The function puts the values of the indicated GPIO channels at the memory pointed by ‘val’. The bit 0 of *val shows the value of GPIO Output channel 0. The bit 1 of *val shows the value of

GPIO Output channel 1. Other bits show the corresponding GPIO Output channels. Because there are only four channels, bit 4 ~ bit 7 of *val are always zero.

Here is an example:
If GPIO Output channel 0 and channel 2 are both 1.

```
unsigned char ch;
getOutChLevel( GPO0|GPO2, &ch );
```

The returned value of variable ‘ch’ is 0x5.

Return Value: If the function gets the values successfully, it returns 0. If any error, it returns –1.

Watchdog

1. **Syntax:**

   u8 getWtdTimer(void)

   Description: This function read the value of the watchdog time counter and return it to the caller.
   Parameters: None.
   Return Value: This function return the value of the time counter and return it to the caller as an unsigned integer.

2. **Syntax:**

   void setWtdTimer(u8 val)

   Description: This function sets the watchdog timer register to the value ‘val’ and starts to count down. The value could be 0 ~ 255. The unit is second. Setting the timer register to 0 disables the watchdog function and stops the countdown.
   Parameters: The parameter ‘val’ is the value to set to watchdog timer register. The range is 0 ~ 255.
   Return Value: None.

4.3.3 Power Subsystem

1. **Syntax:**

   i32 getIgnStatus(u8 *ignStatus)

   Description: Get the current ignition status. The ignition has two statuses: ON or OFF.
   Parameters: This function puts the ignition status at the memory pointed by the unsigned character pointer 'ignStatus'. If the returned status is 0xa5, the ignition is ON. If the returned status is 0x5a, the ignition is OFF. There are macros of Ignition ON and Ignition OFF in pwr_acce.h.
   Return Value: If the function gets the ignition status and put it at the memory pointed by the argument successfully, this function will return 0. If any error, the function returns –1.

2. **Syntax:**

   i32 setSoftOffDelayS(u32 setTime)

   Description: The Soft Off Delay is the interval between that the system receives a power off signal and that the system generates a power off signal. This function sets up the interval in seconds.
   Parameters: The parameter is of the type of unsigned long. The value of the parameter ranges from 0~255. The unit of the value of the parameter is seconds.

   Return Value: If the function sets the delay time successfully, it will return 0. If any error, the function returns –1.

3. **Syntax:**

   i32 setSoftOffDelayM(u32 setTime)

   Description: The Soft Off Delay is the interval between that the system receives a power off signal and that the system generates a power off signal. This function sets up the interval in minutes.
   Parameters: The parameter is of the type of unsigned long. The value of the parameter ranges from 0~255. The unit of the value of the parameter is minutes.

   Return Value: If the function sets the delay time successfully, it will return 0. If any error, the function returns –1.

4. **Syntax:**

   i32 setHardOffDelayS(u32 setTime)

   Description: The Hard Off Delay is the interval between that the system is off and that the power 5VSB is off. This functions set up the interval in seconds.
   Parameters: The parameter is of the type of unsigned long. The value of the parameter ranges from 0~255. The unit of the value of the parameter is seconds.
   .
   Return Value: If the function sets the delay time successfully, it will return 0. If any error, the function returns –1.

5. **Syntax:**

   i32 setHardOffDelayM(u32 setTime)

   Description: The Hard Off Delay is the interval between that the system is off and that the power 5VSB is off. This functions set up the interval in minutes.
   Parameters: The parameter is of the type of unsigned long. The value of the parameter ranges from 0~255. The unit of the value of the parameter is minutes.
   .
   Return Value: If the function sets the delay time successfully, it will return 0. If any error, the function returns –1.

6. **Syntax:**

   i32 setPowerOnMode(u8 powerOnMode)

   Description: The function sets up the source of the boot-up signal of the system. There are two choices: boot from the Ignition or boot from the Remote Switch.

   Parameters:

   PowerOnMode = 0xa5, boot up by the Ignition.

   PowerOnMode = 0x5a, boot up by the Remote Switch.

   There are macros of Ignition mode and Remote Switch mode in pwr_acce.h (Linux) and AR-B6002.h(Windows).

   Return Value: If the function sets power-on mode successfully, it will return 0. If any error, the function returns –1.

7. **Syntax:**

   i32 getSoftOffDelay(u32 *Time)

   Description: The Soft Off Delay is the interval between that the system receives a power off signal and that the system generates a power off signal. This function gets the interval.

   Parameters: The parameter is a pointer which points to an unsigned long variable. The returned value is stored at this variable. The unit of the returned value is in seconds.
   Return Value: If the delay time is returned successfully, the function returns 0. If any error, it returns –1.

8. **Syntax:**

   i32 getHardOffDelay(u32 *Time)

   Description: The Hard Off Delay is the interval between that the system is off and that the power 5VSB is off. This function gets the interval.

   Parameters: The parameter is a pointer which points to an unsigned long variable. The returned value is stored at this variable. The unit of the returned value is in seconds.

   Return Value: If the delay time is returned successfully, the function returns 0. If any error, it returns –1.

9. **Syntax:**

   i32 getPowerOnMode(u8 *powerOnMode)

   Description: The function gets the setting of power-on mode. There are two modes: boot from the Ignition or boot from the Remote Switch.

   Parameters: The parameter is a pointer which points to an unsigned character. The returned code is stored at this memory. There are two power-on modes:

   PowerOnMode = 0xa5, boot up by the Ignition.

   PowerOnMode = 0x5a, boot up by the Remote Switch.

   Return Value: If the power-on mode is returned successfully, the function returns 0. If any error, it returns –1

10. Syntax:

i32 getBattVolt(float *volt)

Description: The function gets the voltage reading of the battery.

Parameters: The parameter ‘volt’ is a pointer which points to an variable of type ‘float’. The unit of the returned value is voltage.

Return Value: If the reading of voltage is returned successfully, the function returns 0. If any error, it returns –1

11. Syntax:

i32 getPicFwVer(struct PicInfo *ver)

Description: The function gets version information of Power Subsystem firmware.

Parameters: The parameter is a pointer which points to a ‘PicInfo’ structure, which consists of 9 unsigned characters. Here is the definition of structure ‘PicInfo’:

```
type struct {
    u8 type[3];       // The type of the power subsystem
    u8 mode[4];       // The mode at which the power subsystem is
                         operating.
    u8 majorVersion;    // Major version number of the firmware
    u8 minorVersion;    // Minor version number of the firmware
} PicInfo;

PicInfo picInfo;

getPicFwVer( &picInfo );
printf(“%c.%c\n”, picInfo.majorVersion, picInfo.minorVersion );
```

Return Value: If the version information is returned successfully, the function returns 0. If any error, it returns –1.

12. Syntax:

i32 getPicMode(u8 *mode)

Description: The function gets the mode number at which the Power Subsystem is operating..

Parameters: The parameter is a pointer which points to a variable of type ‘unsigned char’. The returned mode number is put at the memory which is pointed by parameter ‘mode’.

Return Value: If the mode information is returned successfully, the function returns 0. If any error, it returns –1

13. Syntax:

i32 setPicDefault(void)

Description: The function restores the SoftOffDelay and HardOffDelay to the default value.

Parameters: None.

Return Value: If this function works successfully, the function will return 0. If any error, it will return –1.

4.4 Appendix

Users have to modify the boot loader configuration to support COM6. Take the grub configuration file as an example. Add ‘8250.nr_uarts=XX noirqdebug’ at the setting of kernel. Here, XX represents the number of COM ports the system will support. Because the power subsystem connects to main system via COM6, the XX must be greater or equal to 6.

1. Modify the grub.conf.

```
[root@linux ~]# vi /boot/grub/grub.conf
default=0
timeout=5
splashimage=(hd0,0)/grub/splash.xpm.gz
hiddenmenu
title Fedora Core (2.6.27.5.117.FC10)
root (hd0,0)
kernel /vmlinuz-2.6.27.5.117.FC10 ro root=/dev/hda2 rhgb quiet
8250.nr_uarts=6 noirqdebug
initrd /initrd-2.6.27.5.117.FC10.img
```

2. List the status of the COM ports in the system.

```
# setserial -g /dev/ttyS*
/dev/ttyS0, UART: 16550A, Port: 0x03f8, IRQ: 4
/dev/ttyS1, UART: 16550A, Port: 0x02f8, IRQ: 3
/dev/ttyS2, UART: 16550A, Port: 0x03e8, IRQ: 11
/dev/ttyS3, UART: 16550A, Port: 0x02e8, IRQ: 10
/dev/ttyS4, UART: 16550A, Port: 0x04f8, IRQ: 11
/dev/ttyS5, UART: 16550A, Port: 0x04e8, IRQ: 10
```

The node ‘/dev/ttyS5’ corresponds to COM6. The IO port is 0x4e8, IRQ 10.

5 OPTIONAL MODULE SPECIFICATIONS

5.1 GPS

WIESON ZYM-5020 GPS Module

G5020-1 is a high performance, low power consumption、small size、very easy integrated GPS engine board, designed for a broad spectrum of OEM system applications. The GPS engine board will track up to 16 satellites at a time, provide fast time-to-first-fix and one-second navigation updates.

Features

(1) Build on high performance Ublox5 chipset, -160dBm tracking sensitivity.
(2) Average Cold Start time and under 30 seconds. 16 channels “All-in-View” tracking, providing accurate satellite position data.
(3) ±0.5ppm temperature compensated crystal oscillators (TCXO) to offer higher stability.

Please refer to GPS user’s manual for details.

5.2 Bluetooth

Qcom QBTM400-01 Bluetooth Module

Features

- CSR BlueCore4-ROM (A07) Single Chip Bluetooth System
- Bluetooth 2.1 + EDR support
- Class 2 Bluetooth operation with full 7 slave Piconet support
- Full Speed USB interface compliant with USB V1.1 and compatible with USB V2.0
- Single onboard Antenna connector support
- Simple Pairing, Version 2.1 + EDR to advance its short range wireless technology and make it easier for consumers to connect *Bluetooth* devices.

Specification Compliance

- Bluetooth Specification V1.2, V2.0, V2.1 and V.2.1+EDR compliant
- USB Specification V1.1
- compatible with USB V2.0 Full Speed (12Mbits/s)

5.3 WiFi

Advantech WiFi-105E Module

Features

IEEE 802.11 b/g/n standards
PCI Express full-size Mini Card interface
Up to 300 Mbps data rate
WEP/WPA/WPA2 security
1T x 2R MIMO technology
Low power consumption for embedded system

5.4 Sierra 3.5G

Sierra MC8790 3.5G Module

Features

Support GSM/GPRS/EDGE/UMTS/HSDPA

5.5 Huawei 3.5G

Huawei EM770W 3.5G Module

Features

Support GSM/GPRS/EDGE/UMTS/HSDPA